Carrier
TRANSICOLD

OPERATION AND SERVICE MANUAL

DIRECT DRIVE REFRIGERATION UNIT

XARIOS

150, 200, 300ry, 350, 400, 500

Carrier
A United Technologies Company

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SECTION 1

SAFETY INSTRUCTIONS

This manual contains safety and service instructions to follow in order to prevent any accident. Stickers have been placed on the product for your **SAFETY**.

BEFORE USING THIS REFRIGERANT UNIT, read carefully all safety information explained in this manual and indicated on the product. Be sure that everybody who will use this refrigeration unit has been trained to use it in a safe way.

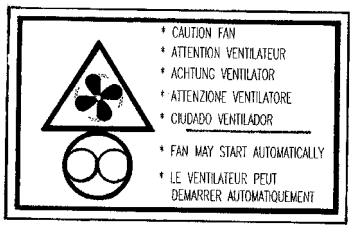
DURING THE USE OR MAINTENANCE OF THIS REFRIGERATION UNIT, the notes on safety are to be considered.

Personal Protective Equipment :

Always use adequate Personal Protective Equipment before doing anything on this refrigerant unit, as explained in this manual.

Working at height :

Take all necessary safety precautions when accessing this refrigeration unit : use safe ladders, working platforms with appropriate guards.



Belts and fans :

This refrigeration unit is equipped with Auto–start/stop, it may start at any time and without warning.

When the unit is running beware of belts and fans that are moving.

Before servicing refrigeration unit, make sure the main power switch is on the OFF position. Ensure the unit will not restart. Lock–out / Tag–out can be performed as described above.

When there is protective structure (fan grid or guard for example) make sure they are in place. Never removed them when the refrigeration unit is running.

Always keep your hands, body parts, clothes, hairs and tools far from moving parts.

Electricity :

When this refrigeration unit is running in electrical operation, some devices are powered up especially in the electrical control box.

Before servicing refrigeration unit, make sure the main power switch is on the OFF position. Ensure this refrigeration unit is disconnected from the local electrical network.Lock–out / Tag–out can be performed as described above.

Before working in the electrical control box, it is required to control the lack of tension.

WHEN IT IS NECESSARY TO WORK IN THE ELECTRICAL CONTROL BOX UNDER TENSION, PEOPLE MUST BE QUALIFIED FOR WORKS UNDER LOW OR HIGH VOLTAGE.

Always use adequate tools and Personal Protective Equipment when working on electrical devices : safety gloves and safety glasses.

Refrigerant :

The refrigerant contained in this refrigeration unit can cause frosbite, severe burns or blindness in case of projection and direct contact with the skin or eyes.

In contact with flame or heat refrigerant generate toxic gas.

Refrigerant handling must be done by qualified people.

Keep any flame, any lighted object or any source of sparks away from the refrigerant unit.

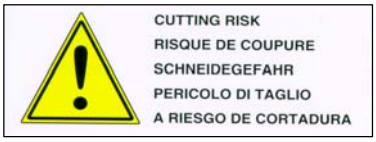
Always use Personal Protective Equipment when handling refrigerant : safety clothes, safety gloves and safety glasses.

Burning with hot and cold :

When this refrigeration unit is running or even after, different components can be very cold or hot (exhaust pipe, tubes, coils, receiver, accumulator or engine for example)

Beware when operating closed from cold or hot components.

Always use adequate safety gloves when doing any maintenance on this refrigeration unit.



Cuttings :

Beware when handling or operating closed from parts that could be sharp (coils, evaporators, clamps for example).

Always use adequate safety gloves when doing any maintenance on this refrigeration unit.

Environment :

Think about protection of environment during all the life of this refrigeration unit.

To prevent environmental damages NEVER release refrigerant in the atmosphere, NEVER throw coolant, oil, battery and chemicals in the nature. It must be recuperate and recycle according to current regulations.

When disposing this refrigerant unit do it in an environmentally sound way and in accordance with current regulations.

CAUTION

Under no circumstances should anyone attempt to repair the Logic or Display Boards. Should a problem develop with these component, contact your nearest Carrier Transicold dealer for replacement.

Under no circumstances should a technician electrically probe the processor at any point, other than the connector terminals where the harness attaches. Microprocessor components operate at different voltage levels and at extremely low current levels. Improper use of voltmeters, jumper wires, continuity testers, etc. could permanently damage the processor.

Most electronic components are susceptible to damage caused by electrical static discharge (ESD). In certain cases, the human body can have enough static electricity to cause resultant damage to the components by touch. This is especially true of the integrated circuits found on the truck/trailer microprocessor.

SECTION 2

DESCRIPTION

2.1 INTRODUCTION

WARNING

Beware of unannounced starting of engine or standby motor caused by the unit thermostat or the start/stop cycle.

Personal Protective Equipment : before doing anything on this product, as explained in this manual.Always use safety precautions before doing any maintenance on the unit

safety glasses , gloves , safety shoes , safety clothes

This manual contains Operating Data, Electrical Data and Service Instructions for the van refrigeration units listed in Table 2-1. Also Table 2-1 charts some significant differences between these models.

The XARIOS 150/200/300ry/350/400/500 models are units designed for truck applications. Two types of drive are available :

- **Road operation**

  – driven by the engine of the vehicle when in operation over-the-road.

- **Road/Standby version**

  – driven by the engine of the vehicle when in operation over-the-road and by connecting the unit to the mains power on shut-down.

The model/serial nameplate is located inside of the unit on the frame as shown in Figure 2-1, Figure 2-2 and Figure 2-3.

The standard control system is a microprocessor controller. Once the controller (remote Command within the cab of the truck) is set at the desired temperature, the unit will operate automatically to maintain the desired temperature within very close limits.

The control system automatically selects cooling and heating cycles as necessary to maintain the desired temperature.

The evaporator assembly consists of an evaporator coil, an expansion valve, one defrost thermostat (termination switches) and an electrical evaporator fan motor, one starting valve and a optional injection valve.

Table 2-1 Model Chart

Model	R-404A		Road compressor	Standby Compressor	Condenser Weight	
	LB	KG			Road	Road and Standby
XARIOS 150	2.7	1.2	UP 90 / SD5 H09	HA 090	30 kg	53 kg
XARIOS 200	4	1.8	TM 13	HA 090	30 kg	53 kg
XARIOS 300 **ry**	3.8	1.7	TM 15	HB 135	40 kg	75 kg
XARIOS 350	4.2	1.9	TM 15	TM 15	40 kg	77 kg
XARIOS 400	6	2.7	TM 16	06VM306 (1 and 3 phases)	90 kg	133 kg
XARIOS 500	6.5	2.9	TM 16	06VM306 (1 phase) 06VM307 (3 phases)	90 kg	143 kg

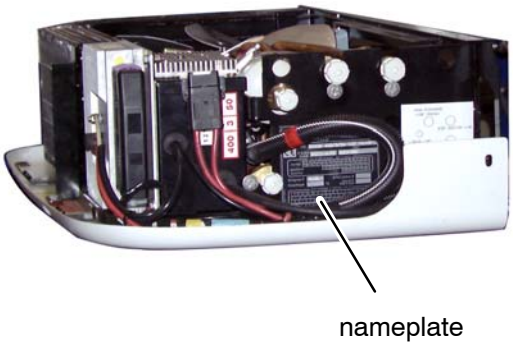


Figure 2-1 XARIOS 150 / 200

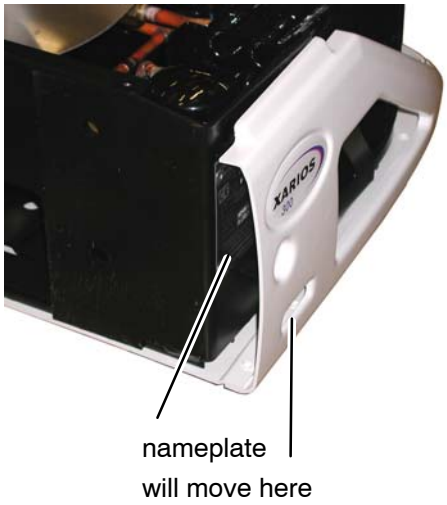
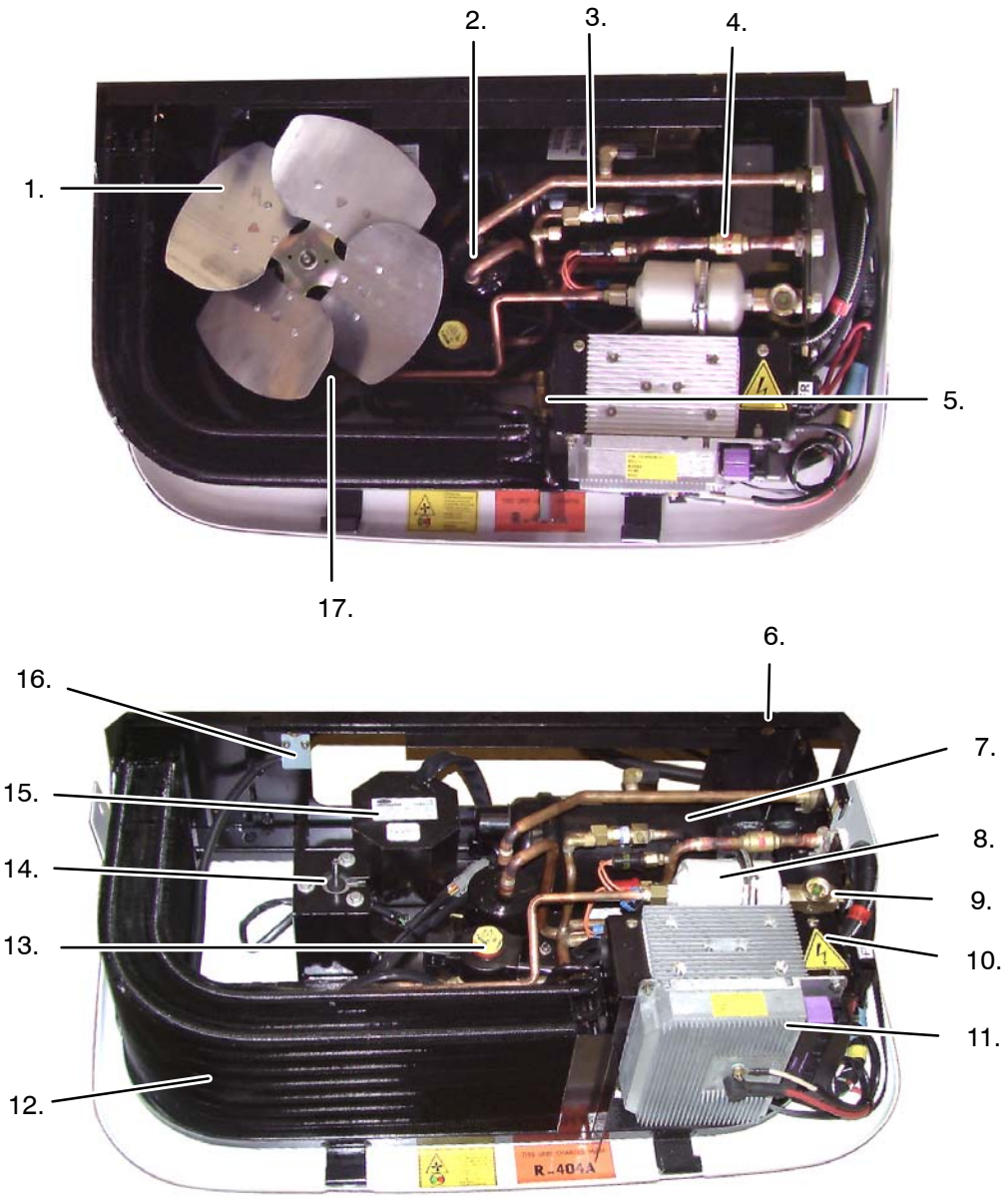


Figure 2-2 XARIOS 300ry / 350

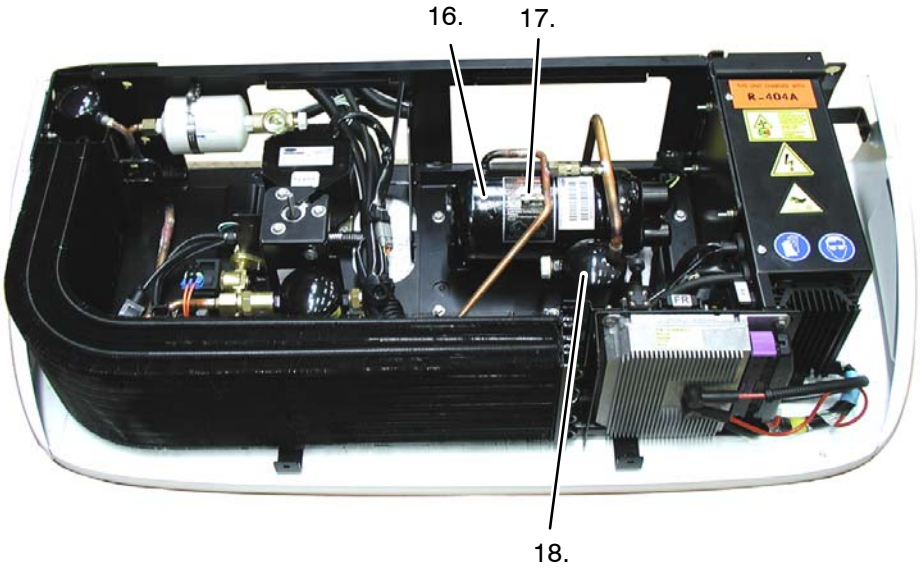
Figure 2-3 XARIOS 400 / 500



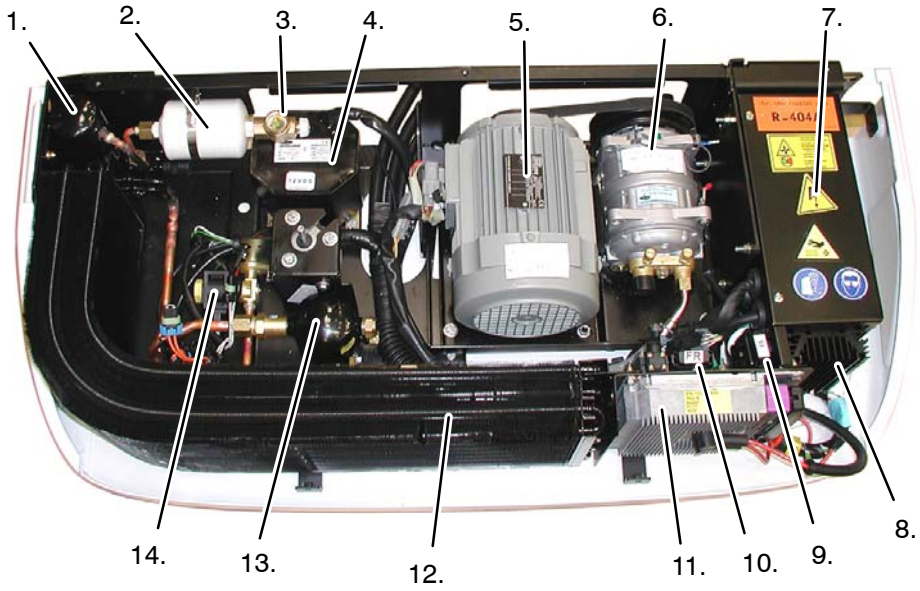
1. Condenser fan
2. Accumulator
3. Standby check valve
4. Road check valve
5. Check valve (option)
6. Frame
7. Compressor
8. Filter-drier
9. Sight glass
10. Control box
11. Microprocessor
12. Condenser
13. Condenser closing solenoid (option)
14. Condenser fan motor
15. Transformer
16. Safety switch
17. Receiver

Figure 2-4 Unit top view

XARIOS 300ry

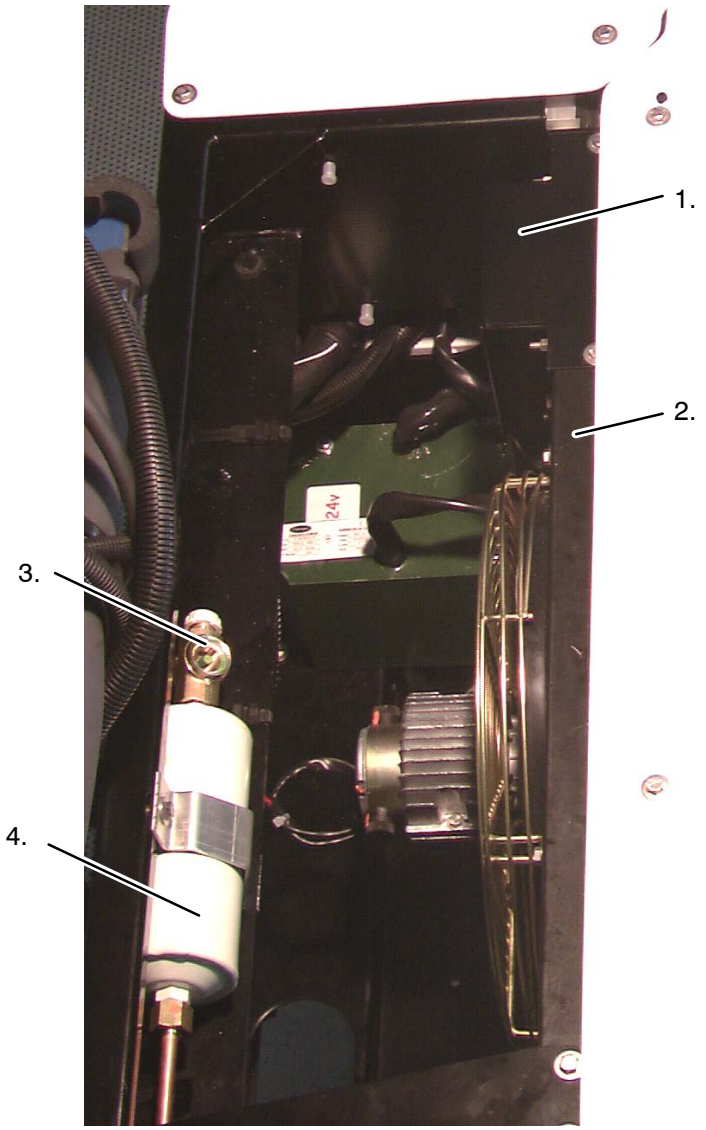


XARIOS 350

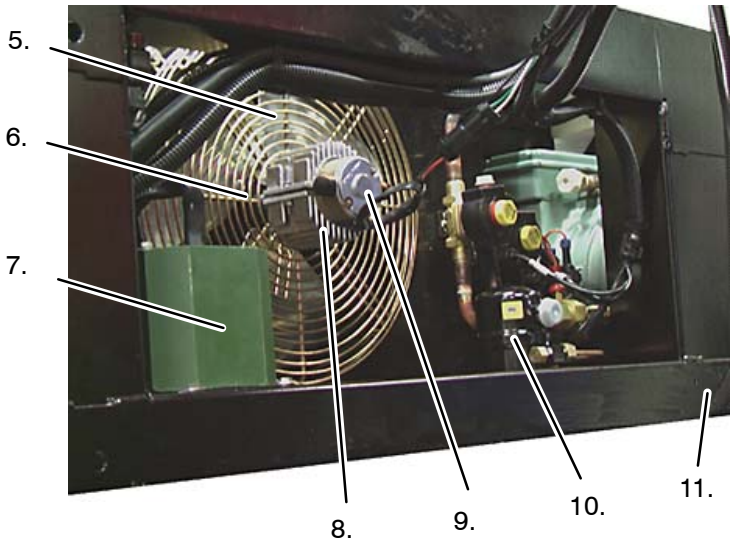


1. Receiver
2. Filter drier
3. Sight glass
4. Transformer
5. Electric motor
6. Compressor (TM15)
7. Electrical box
8. Diode rectifier assembly
9. Standby fuse
10. Road fuse
11. Microprocessor
12. Condenser
13. Oil separator
14. Hot gas solenoid valve
15. Safety switch
16. Rotary Compressor
17. Relief valve
18. Accumulator

Figure 2-5 Unit top view



1. Diode rectifier assembly
2. Condenser
3. Sight glass
4. Filter drier
5. Fan
6. Fan gard
7. Transformer
8. Cooler
9. Condenser motor
10. Oil separator
11. Frame assembly
12. Coil
13. Condenser closing valve HGS2
14. Defrost valve HGS1



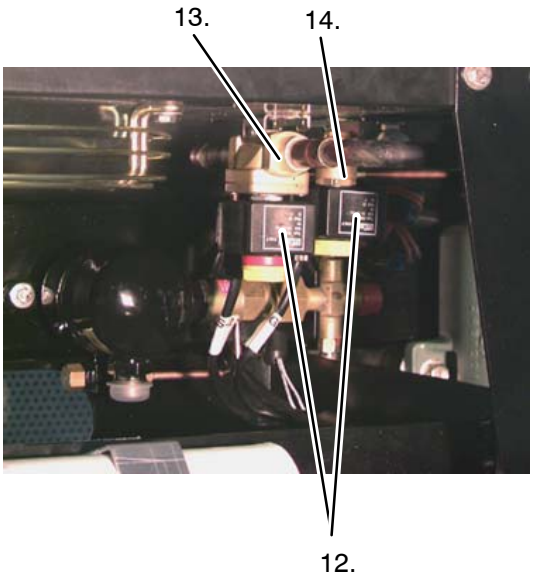
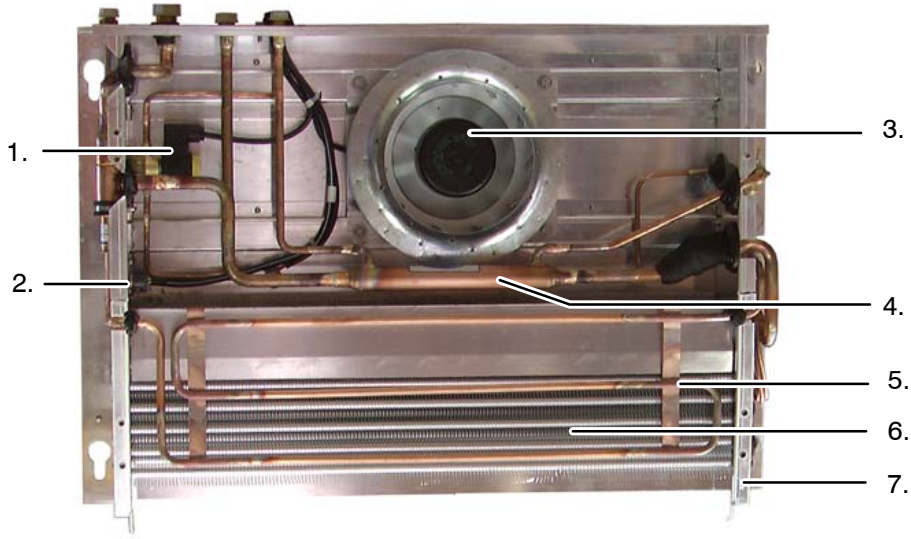
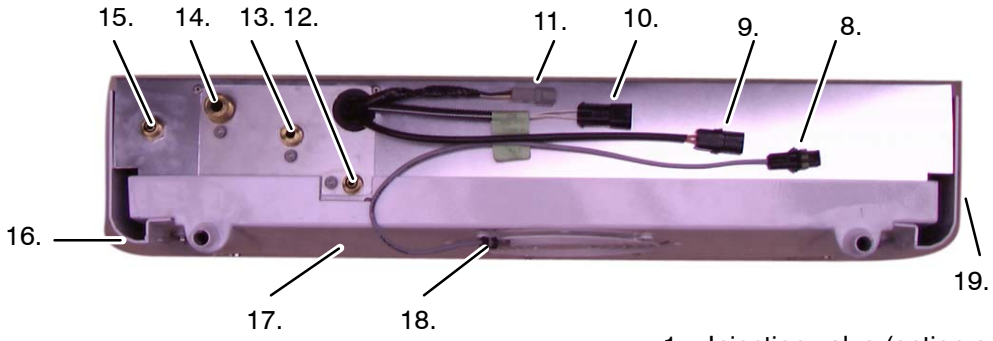


Figure 2-6 Unit top view

EVAPORATOR

Figure 2-7 MXS 600
1 fan (for XARIOS 150)

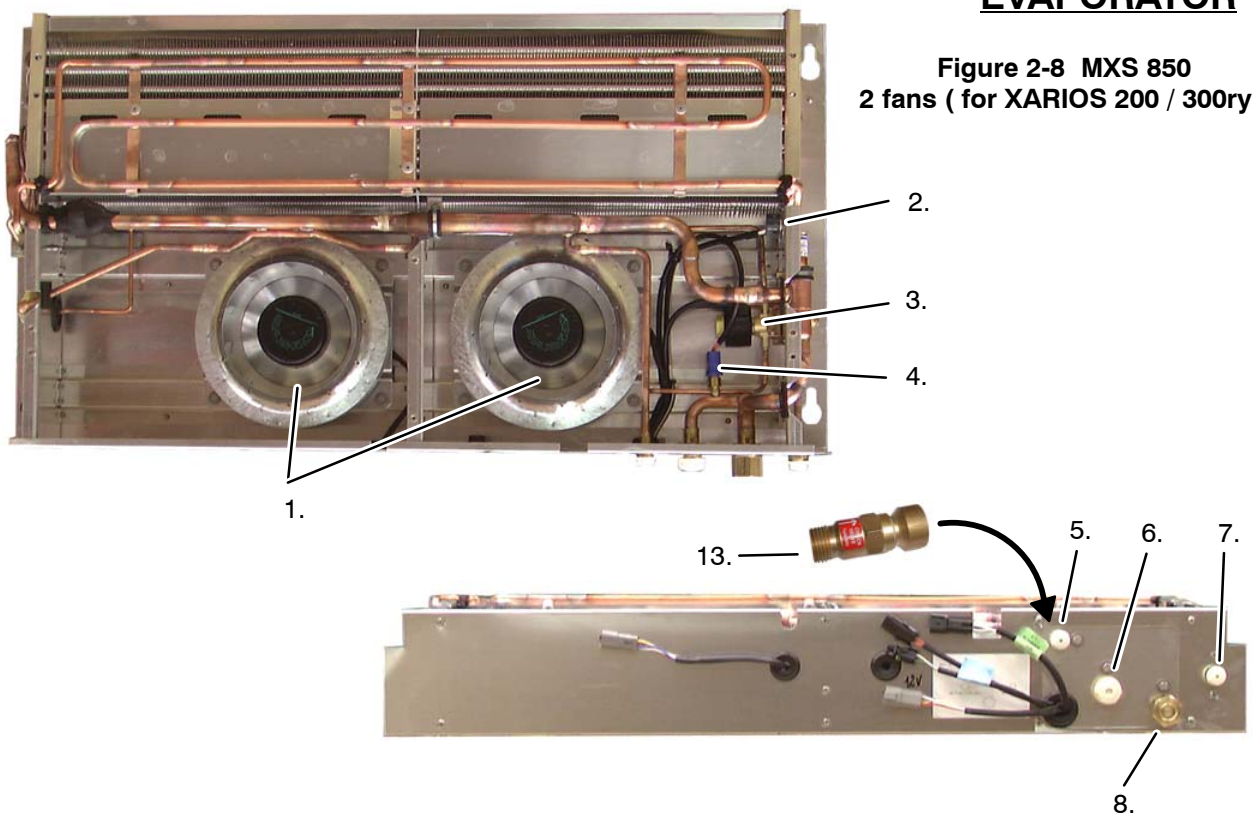


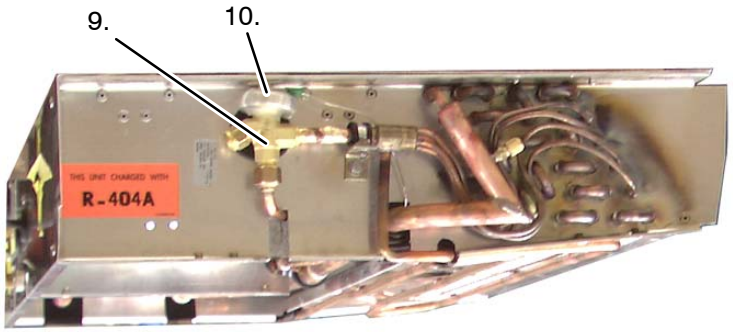


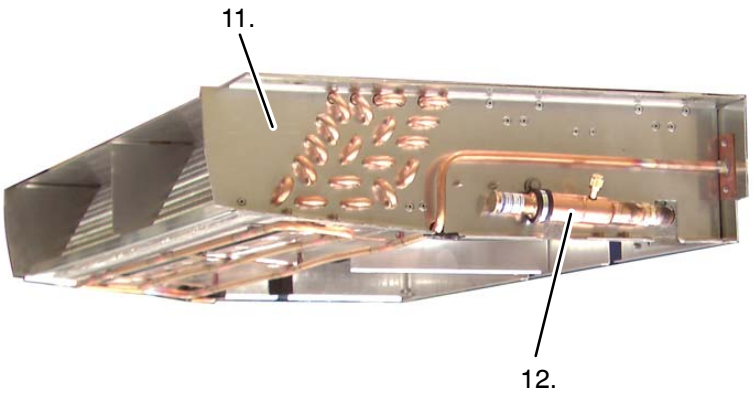
1. Injection valve (option on Xarios 150)
2. Defrost termination thermostat
3. Evaporator fan blower
4. Heat exchanger
5. Defrost element
6. Evaporator coil
7. Frame
8. RAS sensor connector
9. Injection valve connector
10. Klixon connector
11. Fan connector
12. Liquid line
13. Standby suction line
14. Road suction line
15. Hot gas line
16. Left side cover
17. Bottom cover
18. Return air sensor
19. Right side cover
20. Starting valve
21. Expansion valve
22. Quick fitting for superheat adjustment

EVAPORATOR

Figure 2-8 MXS 850
2 fans (for XARIOS 200 / 300ry)



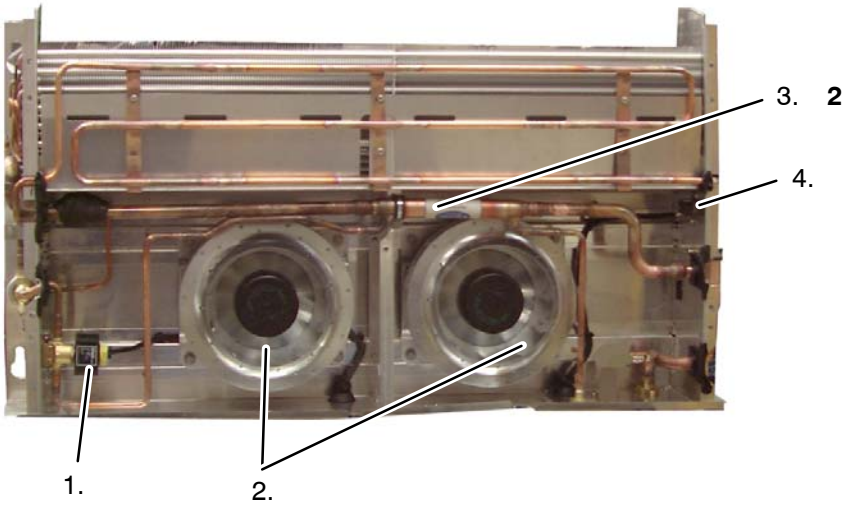


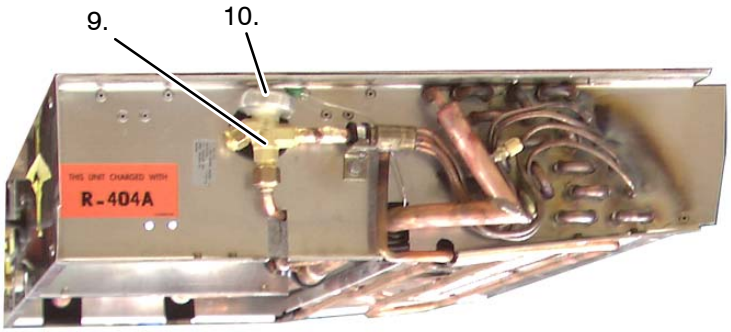


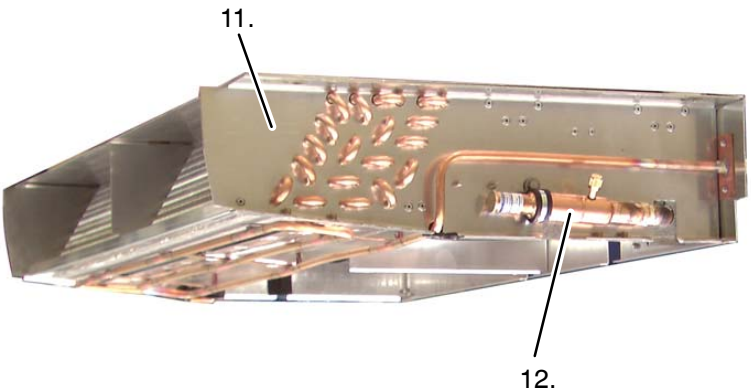
1. Evaporator fan blowers
2. Defrost klixon
3. Injection valve
4. Low pressure switch
5. Liquid line fitting
6. Standby suction line fitting
7. Hot gas line fitting
8. Road suction line fitting
9. Orifice
10. Expansion valve
11. Evaporator coil assembly
12. Starting valve
13. Check valve (optional)

EVAPORATOR

Figure 2-9 MXS 1100
3. 2 fans (for XARIOS 350 / 400)



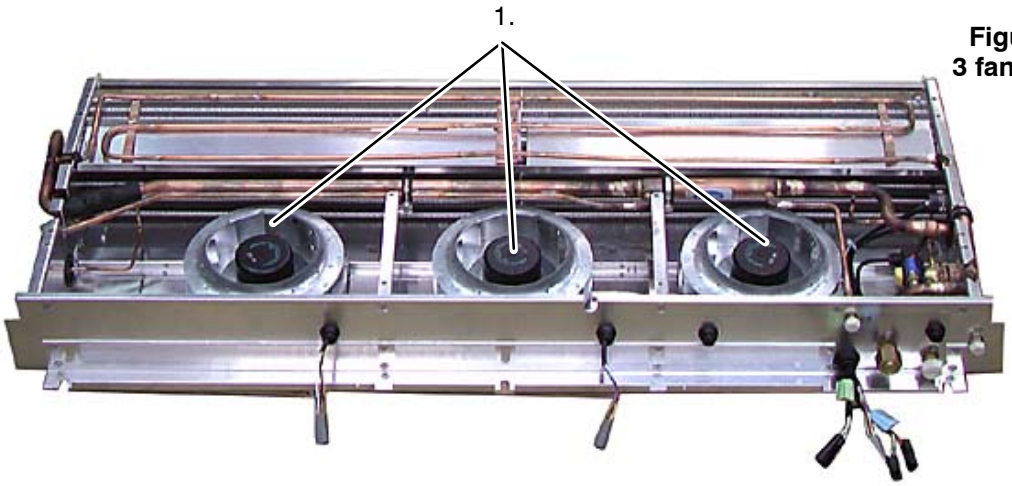




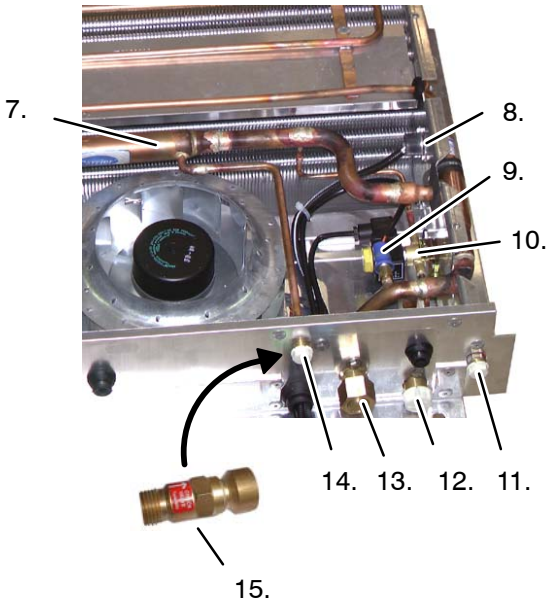
1. Liquid valve
2. Evaporator fan blowers
3. Heat exchanger
4. Defrost klixon
5. Liquid line fitting
6. Hot gas line fitting
7. Suction line fitting
8. Orifice
9. Expansion valve
10. Evaporator coil assembly
11. Starting valve

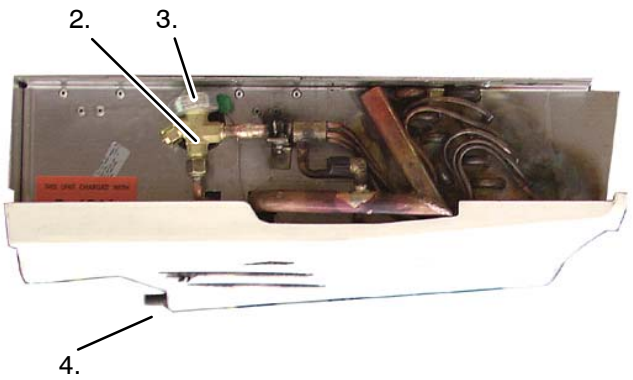
EVAPORATOR

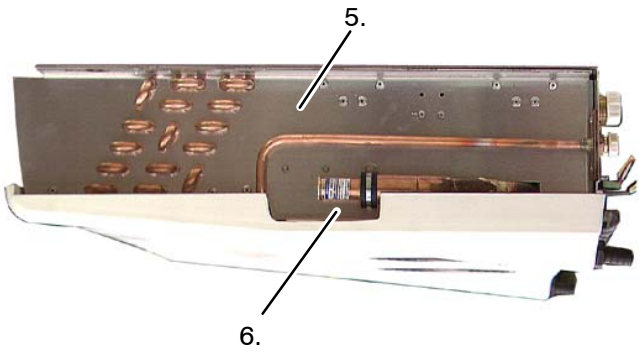
Figure 2-10 MXS 1550
3 fans (for XARIOS 500)



1. Evaporator fan blowers
2. Orifice
3. Expansion valve
4. Hose water drain fitting
5. Evaporator coil assembly

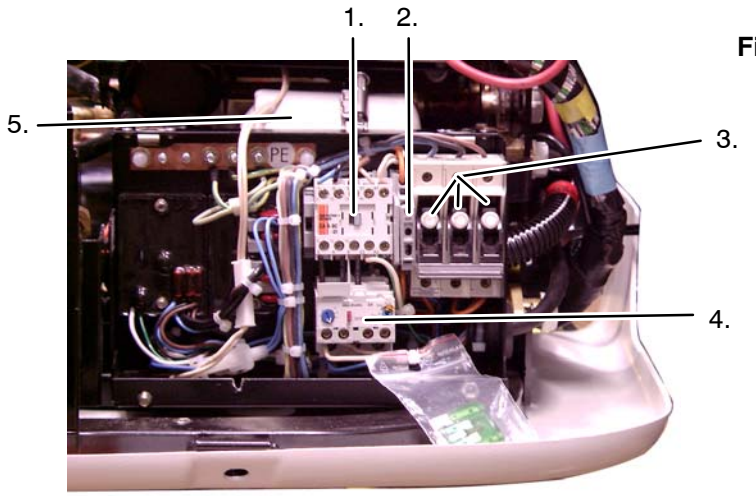




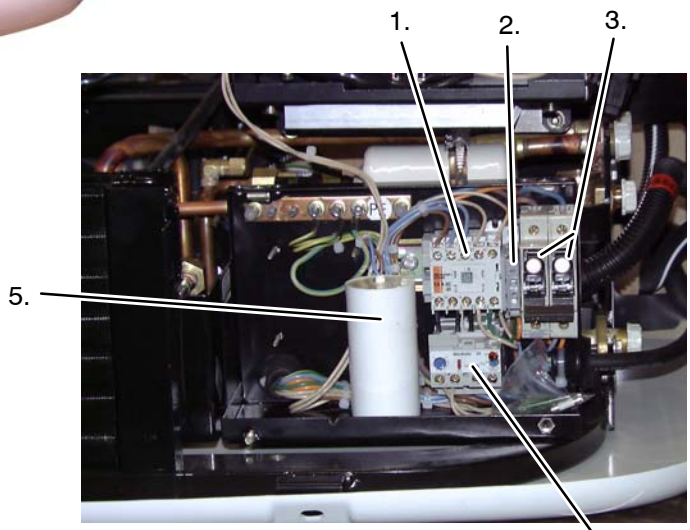


6. Starting valve
7. Heat exchanger
8. Defrost klixon
9. Low pressure switch
10. Injection valve
11. Hot gas fitting
12. Standby suction line fitting
13. Road suction line fitting
14. Liquid line fitting
15. Check valve

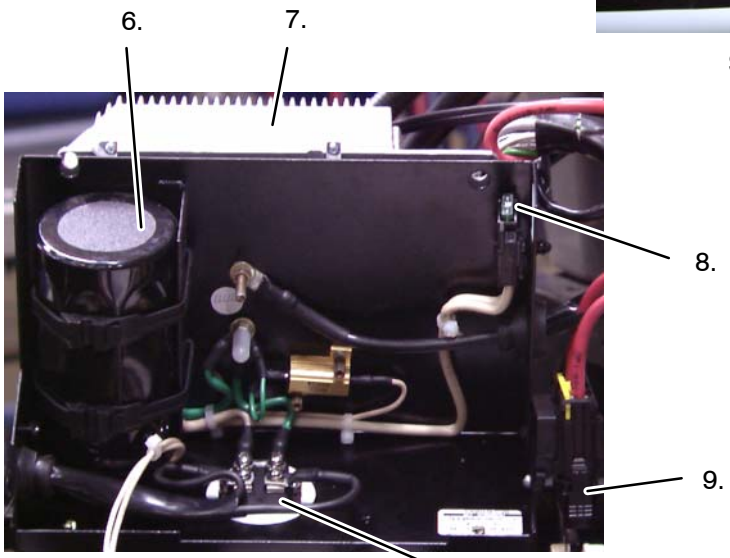
Figure 2-11 XARIOS 150 / 200 Control box



Three phases Road/Stanby



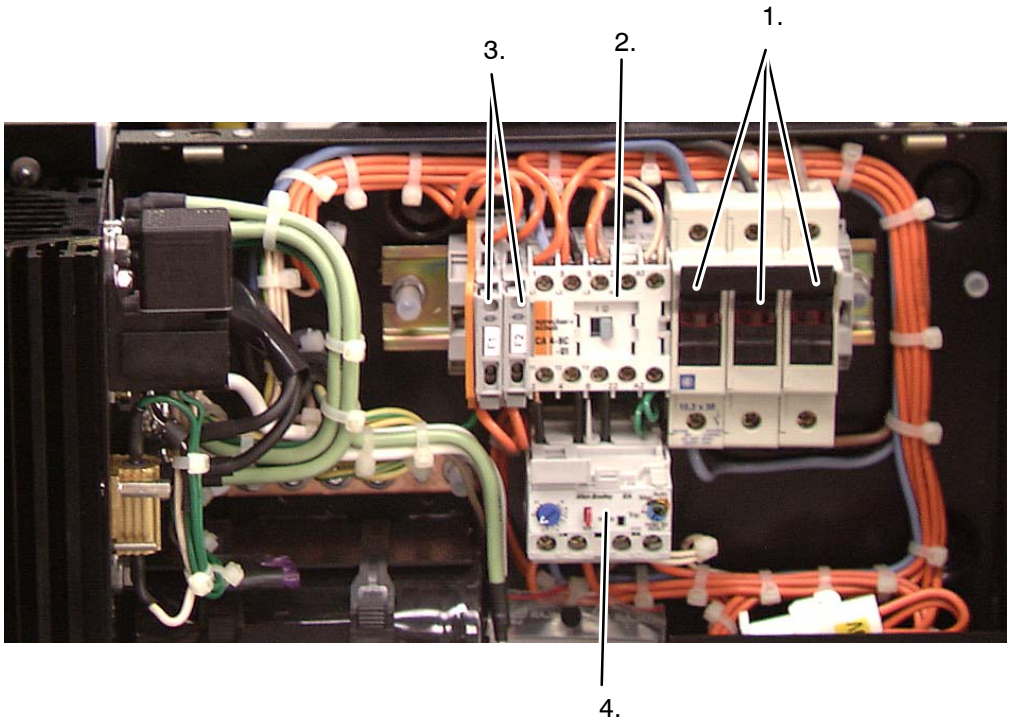
Single phase Road/Stanby

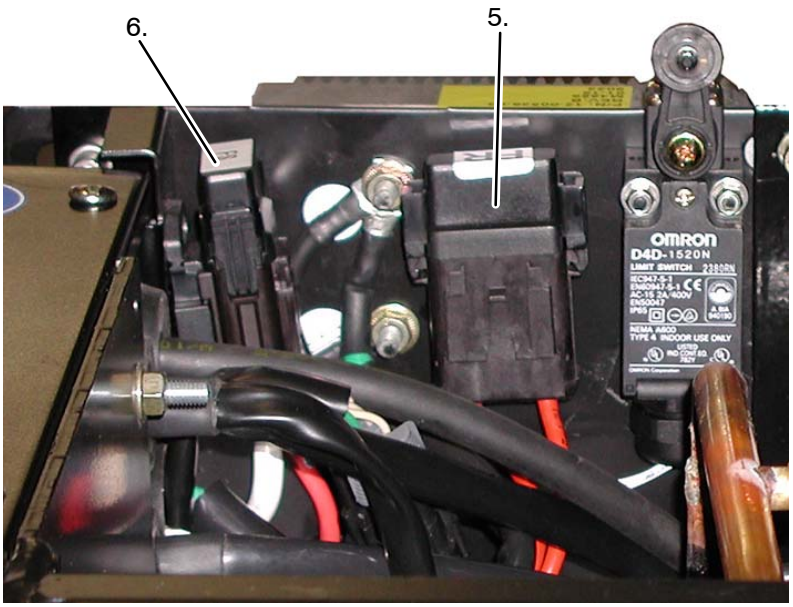


Relay module

1. Standby contactor
2. Primary transformer fuse
3. Main standby fuses
4. Overload relay
5. Permanent capacitor
6. Filter capacitor
7. Microprocessor board
8. Standby fuse
9. Road main fuse
10. Diode bridge

Figure 2-12 XARIOS 300ry / 350 Control Box

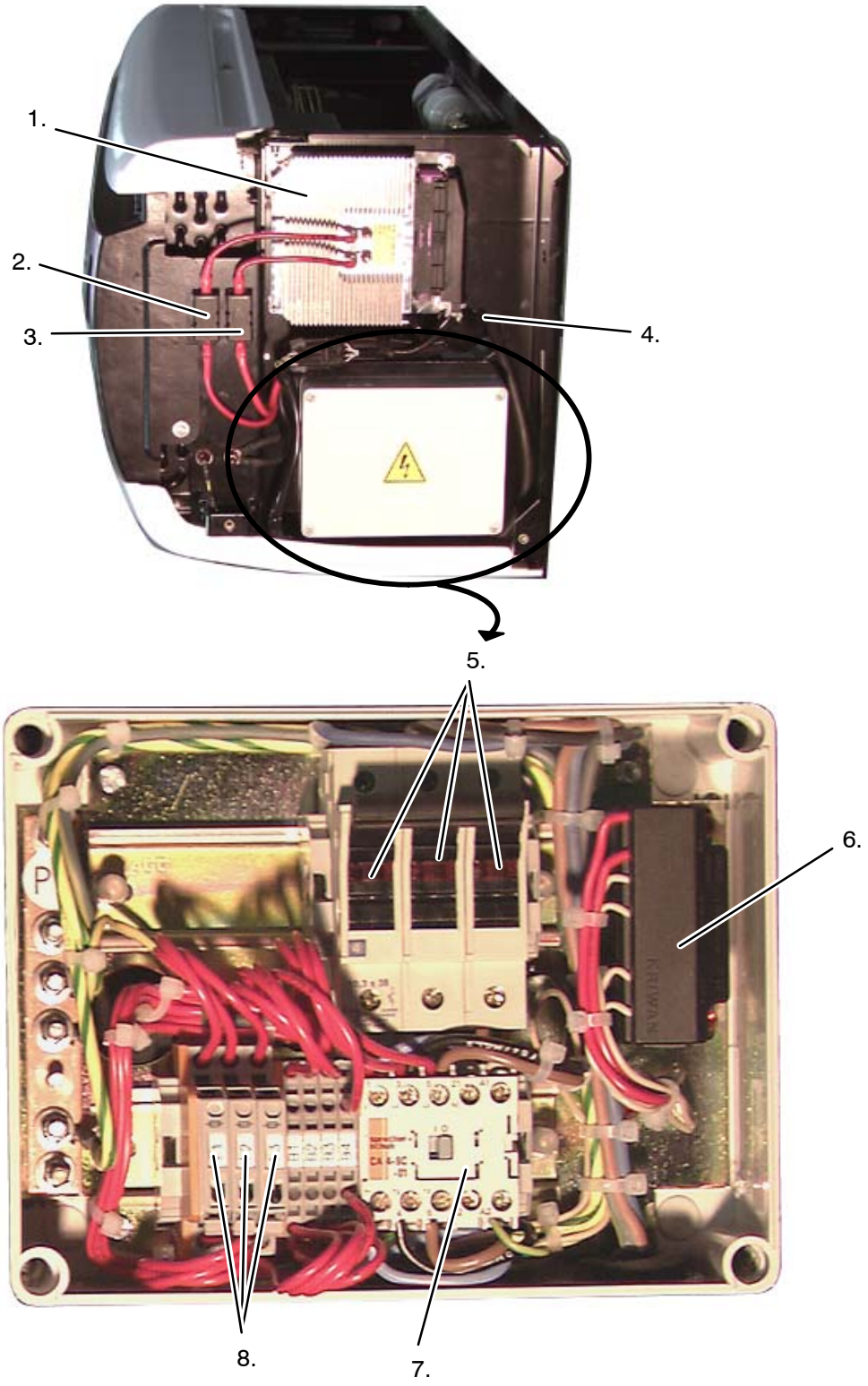




Three phases shown

1. Main standby fuses
2. Standby contactor
3. Primary transformer fuses
4. Overload relay
5. Road fuse
6. Standby fuse

Figure 2-13 XARIOS 400 / 500 Control Box



Three phases shown

1. Microprocessor
2. Standby fuse
3. Road fuse
4. Harness
5. Main standby fuses
6. Electronic overload relay
7. Standby Contactor
8. Primary transformer fuses

2.2 COMPRESSOR REFERENCE DATA

Model	TM 13	HA090	UP 90	TM 15	HB135	TM 16	06VM306	06VM307
Units: Xarios	200	150 200	150	300 350	300 ry	400 500	400 500	400 500
Displacement	131 cc 7.94 in^3	12.7 cc 0.77 in^3	92 cc 5.61 in^3	147 cc 8.91 in^3	19.1 cc 1.16 in^3	163 cc 9.88 in^3	113 cc 6.85 in^3	130 cc 7.88 in^3
No.Cylinders	6	–	10	6	–	6	2	2
Weight	6.7 kg	10.3 kg	6.2 kg	6.7 kg	10 kg	7 kg	37 kg	47kg
Oil Charge	200 ml	355 ml	180 ml	250 ml - road 150 ml - stby	370 ml - stby	250 ml	1200 ml	1200 ml
Approved oil	CARRIER POE #46-60002-02							

2.3 REFRIGERATION SYSTEM DATA

a. Defrost Timer

Automatic triggering or at present intervals :

0, auto, 1h, 2h, 3h, 4h, 5h, 6h

b. Defrost Thermostat (DTT)

Opens at: 9° ± 3°C (48° ± 5°F)
Closes at: 3° ± 3°C (37° ± 5°F)

c. HP R404a Safety Pressure switch (HP1)

Cutout at : 32 bars (465 ± 10 psig)
Cut-in at : 25 bars (360 ± 10 psig)

d. HP R404a Control Pressure switch (HP2)

Cutout at : 17 bars (245 ± 10 psig)
Cut-in at : 22 bars (320 ± 10 psig)

e. HP R404a Control Pressure switch (HP3)

Cutout at : 30 bars (430 ± 10 psig)
Cut-in at : 25 bars (360 ± 10 psig)

f. Refrigerant charge

Refer to Table 2-1.

g. Compressor Pressure Regulating Valve (CPR)

at the end of a defrost

MODEL	CPR Setting	
	bar	psig
XARIOS 150	2.2 (2200 rpm)	32 ± 1
XARIOS 200	1.4 (1400 rpm)	20 ± 1
XARIOS 300ry	2 (2000 rpm)	29 ± 1
XARIOS 350 XARIOS 400 XARIOS 500	2.4 (2400 rpm)	35 ± 1
XARIOS 400 XARIOS 500	2.5 (2500 rpm) (standby)	36 ± 1
CAUTION: Adjustement on road ONLY		

h. Thermostatic expansion valve superheat

Type: TES 2 / Orifice n°1 / MOP 75 psi (Xarios150)
TES 2 / Orifice n°2 / MOP 75 psi (Xarios 200 / 300)
TES 2 / Orifice n°3 / MOP 75 psi (Xarios 350 / 400)
TES 2 / Orifice n°4 / MOP 75 psi (Xarios 500)
Set for a box temperature of -20°C (0°F)
4°C (7 ± 1°F) during commissioning

i. R404a low pressure switch

Cutout at : -0.2 bar (-2.9 psig ± 3 psi)
Cut-in at : 1 bar (14.5 psig ± 3 psi)

j. Quench valve (option on Xarios 150)

Opens at: 127°C (260°F)
Closes at: 105°C (212°F)

2.4 ELECTRICAL DATA

a. Evaporator fan motors

	12 V	24 V
Bearing lubrification	factory lubrificated	factory lubrificated
Horse power	0.1 kw	0.1 kw
Operating amps	7 to 9 amps	4 to 6 amps
Speed	2100 rpm (rated)	2150 rpm (rated)

b. Standby motors speed

– 1450 rpm – 50 hz

– 1760 rpm – 60 hz

c. Overview motor or moto compressor ratings

UNIT	Voltage	Frequency	Phase	kW	HP	Standby motor ratings **(amps)**		
						Constructor data		Unit overload setting
						MRA*	LRA*	
Xarios 150/200	115	60 Hz	1	0.85	1.14	13.5	55.3	6.3
	220/240	50 Hz	1	0.85	1.14	5.6	17.2	
	208/230	60 Hz	1	0.85	1.14	7	23	7
	400	50 Hz	3	0.85	1.14	2.2	6.47	1.5
Xarios 300 ry	230	50 Hz	1	1.1	1.47	8	21.9	8.5
	400	50 Hz	3	1.1	1.47	4.5	15.2	3.7
Xarios 350	230	50 Hz	1	1.5	2	8.5	52	8.5
	230	50 Hz	3	1.5	2	6.4	32	6.4
	400	50 Hz	3	1.5	2	3.7	18	3.7
	208	60 Hz	1	1.5	2	9.05	53	9.1
	230	60 Hz	1	1.5	2	8.4	60	8.4
	460	60 Hz	3	1.5	2	3.5	18	19
Xarios 400	230	50 Hz	3	1.491	2	9.5	42.8	KRIWAN
	400	50 Hz	3	1.491	2	5.7	21.7	KRIWAN
	230	60 Hz	3	1.491	2	11.8	45.1	KRIWAN
	400	60 Hz	3	1.491	2	9.8	26	KRIWAN
	230	50 Hz	1	1.491	2	13.9	65.6	KRIWAN
	208/230	60 Hz	1	1.491	2	21.4	80.6	KRIWAN
Xarios 500	230	50 Hz	3	1.865	2.5	11.8	43.1	KRIWAN
	400	50 Hz	3	1.865	2.5	6.8	24.9	KRIWAN
	230	60 Hz	3	1.491	2	11.8	45.1	KRIWAN
	400	60 Hz	3	1.491	2	9.8	26	KRIWAN
	230	50 Hz	1	1.491	2	13.9	65.6	KRIWAN
	208/230	60 Hz	1	1.491	2	21.4	80.6	KRIWAN

* MRA : Maximum Rotor Amps

* LRA : Locked Rotor Amps

2.5 TORQUE VALUES

Assembly	**kg-m**	**ft-lb**
Standby compressor platform	5.5	40
Standby motor platform	5.5	40
Standby motor pulley	4.5	32
Compressor pulley	3.0	22
Evaporator fan motor	1.8	13
Evaporator fan	1.0	7
Condenser - frame	1.0	7
Condenser fan blade	2.5	18
Mounting bolts	6 to 8	44 to 60

2.6 SAFETY DEVICES

System components are protected from damage caused by unsafe operating conditions by automatically shutting down the unit when such conditions occur. This is accomplished by the safety devices listed in Table 2-2.

Table 2-2 Safety Devices – Microprocessor controller

Unsafe Conditions	Safety Device	Automatic restart with fault cleared	Device setting
1. Excessive drop in pressure	Automatic reset of low pressure switch	YES	Cutout : -0.2 bar (R404A) Timer 5 mn
2. Excessive current draw on all microprocessor outputs (evaporator and condenser fan)	Electronic relay	YES	Self-protected opening
3. Excessive current draw control circuit	Fuse on electronic board	NO	Self-protected opening
4. Excessive current draw moto compressor or standby motor	Overload relay	YES	See electrical wiring diagram
5. Excessive current draw evaporator and condenser fan motors	Electronic relay	YES	Self-protected opening
6. Excessive compressor discharge pressure	Automatic reset of High pressure switch (HP1/HP3)	YES	Timer 5 mn
7. Excessive current draw unit on standby	Standby fuse (see Figure 2-11, Figure 2-12 or Figure 2-13)	NO	See fuse Table 2-3, Table 2-4 & Table 2-5
8. Excessive current draw unit on road	Road fuse (see Figure 2-11, Figure 2-12 or Figure 2-13)	NO	See fuse Table 2-3, Table 2-4 & Table 2-5
9. Connection error on primary transformer	Standby Fuses (see Figure 2-11, Figure 2-12 or Figure 2-13)	NO	See fuse Table 2-3, Table 2-4 & Table 2-5
10. Excessive temperature on moto compressor or standby motor winding	O.L.P. (overload protector) **(EXCEPT for Xarios 300ry in 3 phases)**	YES	Self-protected opening
11. Clutch malfunction - road (excessive current draw)	Electronic relay	YES	Self-protected opening
12. Clutch malfunction - road (insufficient current draw)	Electronic relay	YES	Detection of min. threshold at 750 mA
13. Double power supply (road + standby)	Microprocessor	YES	Display on Cab Command until one of the 2 power supplies have been disconnected.
14. Low battery voltage	Microprocessor	YES	Cutout/cut-in at 10 V for 12 V unit at 20 V for 24 V unit

2.6.1 Fuses

Table 2-3 Fuses – Xarios 150/200								
Item		230 / 1 / 50hz		208 / 1 / 60Hz		400 / 3 / 50Hz	
		12V	24V	12 V	24 V	12 V	24V
1.	Road supply fuse	30 A	20 A	30 A	20 A	30 A	20 A
2.	Standby supply fuse (a)	30 A	20 A	30 A	20 A	30 A	20 A
3.	Main standby fuse FB (x2)(b)	10 A		10 A		4 A	
4.	Transformer primary fuse F1	4 AT		4 AT		2.5 AT	
5.	Main road fuse (c)	40 A		40 A		40 A	

Table 2-4 Fuses – Xarios 300ry/350													
Item		230 / 1 / 50HZ		230 / 3 / 50hz (except for 300ry)		400 / 3 / 50Hz		208 / 1 / 60Hz (except for 300ry)		230 / 1 / 60Hz		400 / 3 / 60Hz	
		12V	24 V	12V	24V	12V	24V	12V	24V	12 V	24 V	12 V	24V
1.	Road supply fuse	300ry:30 A 350:40 A		40 A		300ry:30 A 350:40 A		40 A		300ry:30 A 350:40 A		300ry:30 A 350:40 A	
2.	Standby supply fuse (a)	30 A	20 A	30 A	20 A	30 A	20 A	30 A	20 A	30 A	20 A	30 A	20 A
3.	Main standby fuse FB (x2)(b)	12 A		10 A		300ry: 6 A 350: 10 A		12 A		12 A		300ry: 6A 350: 10 A	
4.	Standby clutch fuse FC **(except for 300ry)**	5 A	3 A	5 A	3 A	5 A	3 A	5 A	3 A	5 A	3 A	5 A	3 A
5.	Transformer primary fuse F1/F2	4 AT		2.5 AT		2.5 AT		4 AT		4 AT		2.5 AT	
6.	Main road fuse (c)	50 A		50 A		50 A		50 A		50 A		50 A	

Table 2-5 Fuses – Xarios 400/500													
Item		230 / 3 / 50HZ		400 / 3 / 50hz		230 / 3 / 60Hz		400 / 3 / 60Hz		230 / 1 / 50Hz		208–230 / 1 / 60Hz	
		12V	24 V	12V	24V	12V	24V	12V	24V	12 V	24 V	12 V	24V
1.	Road supply fuse	50 A	40 A	50 A	40 A	50 A	40 A	50 A	40 A	50 A	40 A	50 A	40 A
2.	Standby supply fuse (a)	50 A	40 A	50 A	40 A	50 A	40 A	50 A	40 A	50 A	40 A	50 A	40 A
3.	Main standby fuse FB (x3)(b)	16 A		10 A		16 A		12 A		Circuit breaker max setting		Circuit breaker max setting	
4.	Transformer primary fuse F1/F2/F3	3.15AT	4 AT	3.15 AT		3.15AT	4 AT	3.15 AT		5 AT		5 AT	
5.	Main road fuse (c)	60 A	50 A	60 A	50 A	60 A	50 A	60 A	50 A	60 A	50 A	60 A	50 A

(a) On road / standby unit only

(b) If located in standby box

(c) This fuse is located close to the vehicle battery (12 or 24 v).

2.7 CAB COMMAND

From his seat, the driver can carry out all the control operations :

- shut-down,
- automatic start-up in road or standby mode,
- adjusting the set-point,
- defrost.

The driver can display the box temperature, and see whether the set-point is being maintained by checking the green indicator. The indicator lights up red in the event of a malfunction.

When the battery voltage is too low, a fail-safe system shuts down the unit. Unit restart is automatic and time-delayed if the voltage rises to the normal level (see Figure 2-14)

Figure 2-14 Cab Command

2.7.1 Introduction

The microprocessor controller card is located in an aluminium control box. The controller comprises the microprocessor, the program memory and the input/output circuits required to interface with the unit.

The cab command is mounted remote in the cab. The command comprises the green and red LED readouts, the keypad and keypad interface (see Figure 2-14).

WARNING

The controller card and cab command must never be repaired by the driver! (see section 3.16). In the event of a malfunction with any of their components please contact your nearest Carrier Transicold distributor so that they can be replaced.

The Carrier Transicold microprocessor controls the following functions :

a. Maintains the box temperature at set-point by regulating through cooling, heat, offmode and automatic defrost cycles.

b. Permanently displays the return air temperature and on request the set-point temperature.

c. Digital display and selection of data.

For further details on digital message display, see section 2.7.7.

2.7.2 Keypad

The keypad comprises six keys enabling the operator to activate various functions, display operating data and to modify operating parameters.

Display

8888	Readout
	Standby operation led
	Road operation led
!	Unit operating data led • Green : cycling (left-hand side) • Red : malfunction (right-hand side)

Keys

	Manual defrost control key
ON	Unit start-up key in standby or road mode
OFF	Unit shut-down key in standby or road mode On road operation, the unit can be shut down with the ignition key.

Unit data and function modification

SET	The SET key, together with the + and – keys, enables display and modification of unit operating data. The display changes parameter each time the SET key is pressed.
-	Decrement key for selected data
+	Increment key for selected data

2.7.3 Digital display

The digital display comprises 4 alphanumeric characters. The default value displayed is the box temperature. The microprocessor enables selection of the display in degrees Celsius or Fahrenheit (see photo Road control box).

The display also includes settings for defrost operation (DF).

2.7.4 Set-point

Modification of the set-point temperature

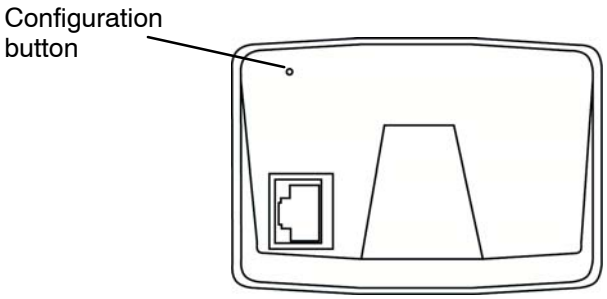
SET	Display of the set-point temperature
-	Decrease the set-point
+	Increase the set-point
SET	Validates set-point temperature. Returns to display of the box temperature.

It is possible to increase or decrease the set-point by whole numbers until the required set-point is displayed. If display stays highlighted, this indicates the set-point displayed has not been validated.

The new setting for the set-point is validated by pressing the SET key.

2.7.5 Configuration

Access by the **configuration button** located on the rear of cab command.



IMPORTANT
Press once on the configuration button.
All changes made are recorded with OFF/ON.

	TEMPERATURE UNIT **Ut°C : celcius degree display** **Ut°F : farenheit degree display**
- +	Press the + or – keys to change Ut°C or Ut°F.
SET	Press the SET key to go to the next configuration.

	UNIT VOLTAGE **PS12 : unit voltage 12 V** **PS24 : unit voltage 24 V**
- +	Press the + or – keys to change PS12 or PS24.
SET	Press the SET key to go to the next configuration.

	NUMBER OF EVAPORATOR FAN **FAn1 : 1 fan** **FAn2 : 2 fans** **FAn3 : 3 fans**
- +	Press the + or – keys to change FAn1, FAn2 or FAn3.
SET	Press the SET key to go to the next configuration.

	FAN SPEED **SPd– : 1st speed mini** **SPd= : 2nd speed medium** **SPd≡ : 3rd speed maxi**
- +	Press the + or – keys to change SPd–, SPd= or SPd≡
SET	Press the SET key to go to the next configuration.

	2 or 3 ET MODE **2 Et : cool, null** **3 Et : cool, null, heat**
- +	Press the + or – keys to change 2 Et or 3 Et. Xarios 300/350 without condenser closing valve : 2 Et Xarios 300/350 with condenser closing valve : 3 Et
SET	Press the SET key to go to the next configuration.

	OPTIONAL ROAD HEATING KIT **hrOF : option road heating kit not installed** **hrOn : option road heating kit installed**
	Press the + or – keys to change hrOF or hrOn.
	Press the SET key to go to the next configuration.

	OPTIONAL STANDBY HEATING KIT **hSOF : option standby heating kit not installed** **hSOn : option standby heating kit installed**
	Press the + or – keys to change hrOF or hrOn.
	Press the SET key to go to the next configuration.

	DRAIN RESISTOR **drOF : drain heater (option) not installed** **drOn : drain heater (option) installed**
	Press the + or – keys to change drOF or drOn.
	Press the SET key to go to the next configuration.

	DOOR SWITCH **dOFF : door switch (option) not installed** **d On : door switch (option) installed**
	Press the + or – keys to change dOFF or d On.
	Press the SET key to go to the next configuration.

IMPORTANT
If when settings are adjusted, no key is activated within 5 sec. the system reverts to displaying the box temperature. **All changes made are recorded with OFF/ON**.

2.7.6 Defrost cycle

Defrost is an independent cycle overriding cooling and heating functions, because it enables the evaporator to be defrosted when necessary. In defrost mode, the microprocessor displays “dF” on the cab command, which no longer displays the set-point.

DEFROST

Defrost is fully automatic but can be manually controlled if authorized by the defrost thermostat.

The defrost cycles are fully managed by the integrated microprocessor.

During the defrost phase, the evaporator fan shuts down. The condenser fan is controlled by the microprocessor.

The end of the cycle is controlled by a “Klixon” thermostat (DTT).

During the defrost phase, the readout of the cab command indicates “dF”.

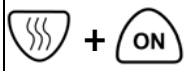
a. Defrost

Defrost mode is activated by the microprocessor automatically or manually by the operator. The cycle stops when the defrost termination thermostat (DTT) is activated. The defrost interval timer is reset to zero when the defrost cycle is terminated, for whatever reason.

b. Defrost termination safety

If the defrost cycle does not terminate after 45 minutes, the cycle terminates automatically and displays alarm code A14.

c. Modification of defrost parameters

	Shut-down unit.
	Display parameters.
	Modify parameters.
	Validate modified settings. Return to display of box temperature.

0 : complete deletion of defrost.

0.5 to 0.9 : decreases time interval between 2 auto defrost cycles in relation to calculated time (coefficient 1).

AUT : automatic defrost optimized by the microprocessor according to the type of cargo transported (variable intervals).

1.1 to 1.5 : increases the time interval between 2 automatic defrost cycles in relation to calculated time (coefficient 1).

1 H, 2 H,... 6 H : Forced interval between each defrost expressed in hours.

IMPORTANT
If when settings are adjusted, no key is activated within 5 sec. the system reverts to displaying the box temperature. All changes made are recorded.

d. Minimum shut-down only on standby

The minimum shut-down for the standby compressor is 5 minutes.

After this minimum shut-down period, the unit restarts when the temperature goes out of the cycling range by ± 1. 2 or 3°C (± 1.8. 3.6 or 5.4°F).

e. Battery voltage

If the battery voltage drops below

10 V for 12 volts unit

20 V for 24 votls unit

the unit shuts down and the cab command displays the message “bAt”.

2.7.7 Alarm display

Access to malfunction codes

Malfunction management

SET	Press SET for 5 seconds : enables access to malfunction codes.

MALFUNCTION CODES Red LED flashes	
A00	No malfunction. Unit in operation.
A01	Cut-out : low-pressure switch (LP).
A02	Cut-out : high-pressure safety switch (HP).
A03	Cut-out : electric motor overload protection or overload relay.
A04	Malfunction : road operation clutch control.
A05	Malfunction : standby contactor control (MC).
A06	Malfunction : condenser fan control (CFM).
A07	Malfunction : evaporator 1 fan control.
A08	Malfunction : heating road 1 control (option).
A09	Malfunction : defrost valve control (HGS1).
A10	Malfunction : quench valve control (BPV).
A11	Malfunction : heating valve control HGS2).
A12	High temperature alarm.
A13	Low temperature alarm.
A14	Defrost alarm > 45 minutes.
A15	Setpoint adjusted out of the range –29°C/+30°C.
A16	Drain water resistor static control fault (DWR).
A17	Thermal breack down standby compressor (PTO).
A18	Static control fault heating standby 1 control (option).
A19	Static control fault liquid valve 1.
A20	LP standby pressure switch opened.
A21	Open circuit detected standby compressor.
A22	Open circuit detected condenser fan (CFM).
A23	Open circuit detected heating road 1 (option).
A24	Open circuit detected defrost valve (HGS1).
A25	Open circuit detected liquid injection valve (BPV).
A26	Open circuit detected hot gas valve (HGS2).
A27	Open circuit detected drain water resistor (DWR1).
A28	Open circuit detected heating standby (option).

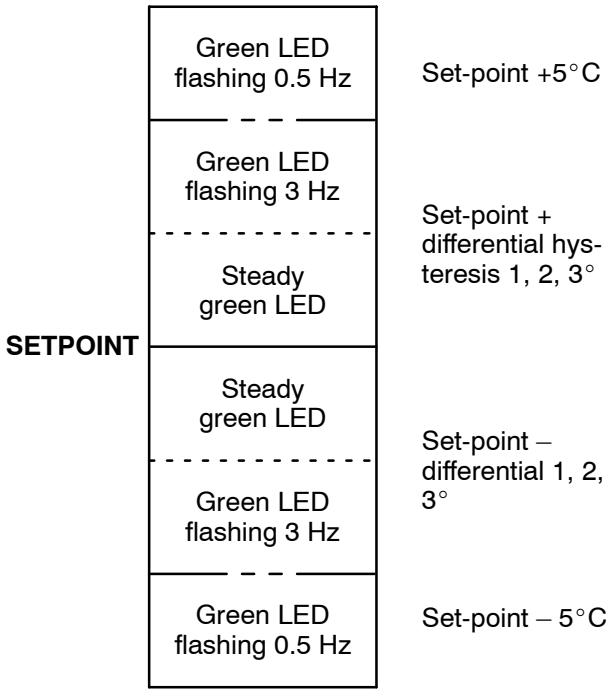
In case of several simultaneous malfunctions, use the keys (-) (+) to list them.

NOTE
Immediate display messages are displayed instead of temperature read-out as soon as the malfunction is detected, and remain displayed as long as malfunction persists. The unit does not run until the malfunction has disappeared or been corrected. **Except** for "**Twin power supply**" where the unit starts in Road mode.

Immediate display in case of malfunction

EE	Malfunction : evaporator temperature probe (RAS)
bAt	Low battery voltage low alarm (< 10 V)
= = =	Twin power supply (road and standby)
Err	Incorrect set-point setting
– – –	Setpoint lower than maximum setpoint but in the range –29°C/+30°C

GREEN LIGHT STATUS



The red alarm LED flashes at 3 Hz after 15' of high or low alarm (alarms AXX)

The red LED flashes at 0.5 Hz when the temperature goes back within the Set-point range ± differential (steady green LED) and the alarm becomes inactive (PXX).

2.7.8 Other data

SET	Press SET for 5 sec. : enables access to malfunction codes
- +	Display of codes for malfunctions
SET	Display of software versions
+	Display of cab command software version
SET	Display of road hourmeter (Road led ON)
SET	Display of standby hourmeter (Standby led ON)
	Defrost interval (mn) calculated by the microprocessor between 2 defrosts
	Elapsed time (mn) since the last defrost
SET	Return to box temperature

IMPORTANT
If when settings are adjusted, no key is activated within 5 sec. the system reverts to displaying the box temperature. All changes made are recorded.

2.7.9 Changing display brightness

ON	Unit start-up
- +	Press during 5 seconds the + or – key to increase or decrease the display brightness.

2.8 COMPRESSOR PRESSURE REGULATING VALVE

This CPR valve is installed on the suction line of ROAD compressor to limit the suction and then avoid overloading of compressor. For CPR settings refer to section 2.3 g.

The suction pressure is controlled to avoid overloading engine during high box temperature operation.

2.9 HOT GAS SOLENOID – HGS1 (TWO-WAY)

The hot gas solenoid is normally closed (NC) and is only powered in defrost and heating modes and 40 seconds before start-up if box temperature is higher than –5°C.

2.10 CONDENSER CLOSING SOLENOID – HGS2 (TWO-WAY)

The condenser closing solenoid is normally open (NO) in cooling mode. It is closed in defrost and heating mode to increase the capacity.

2.11 REFRIGERANT CIRCUIT DURING COOLING (SEE FIGURE 2-15, FIGURE 2-18, FIGURE 2-21 & FIGURE 2-24)

When cooling, the unit operates as a vapor compression refrigeration system. The main components of the system are the reciprocating compressor, air-cooled condenser, thermostatic expansion valve, direct expansion evaporator, and hot gas solenoid (two-way).

The compressor raises the pressure and temperature of the refrigerant and forces it into the condenser tubes.

The condenser fan circulates surrounding air over the outside of the condenser tubes. Heat transfer is thus established from the refrigerant gas (inside the tubes) to the air condenser (flowing over the tubes). The condenser tubes have fins designed to improve the transfer of heat. This removal of heat causes the refrigerant to liquefy; liquid refrigerant flows from the condenser to the receiver.

The refrigerant then flows through the filter-drier, where an absorbent keeps it dry and clean. The refrigerant then flows through a sight glass with moisture indication to the check valve (option) and then to the liquid / gas heat exchanger.

The liquid enters than to the thermostatic expansion valve (with external pressure equalizer) which regulates the flowrate of refrigerant towards the evaporator in order to obtain maximum use of the evaporator heat transfer surface.

The evaporator tubes have aluminium fins to increase heat transfer; therefore heat is removed from the air circulated through the evaporator. This cold air is circulated throughout the truck to maintain the box at the desired temperature.

The transfer of heat from the air to the low temperature liquid refrigerant causes the liquid to vaporize. The steam at low temperature and pressure enters the heat exchanger then enters the compressor pressure regulating valve (CPR – on Road only depends of the unit) which regulates refrigerant pressure entering the compressor, where the cycle starts over.

The discharge pressure is regulated with HP2. If P>22 bars HP2 is switch and the fan is switch on. When the pressure decreases at 17 bars the fan is off.

The quench valve opens as required to maintain a maximum discharge temperature of 127°C (260°F).

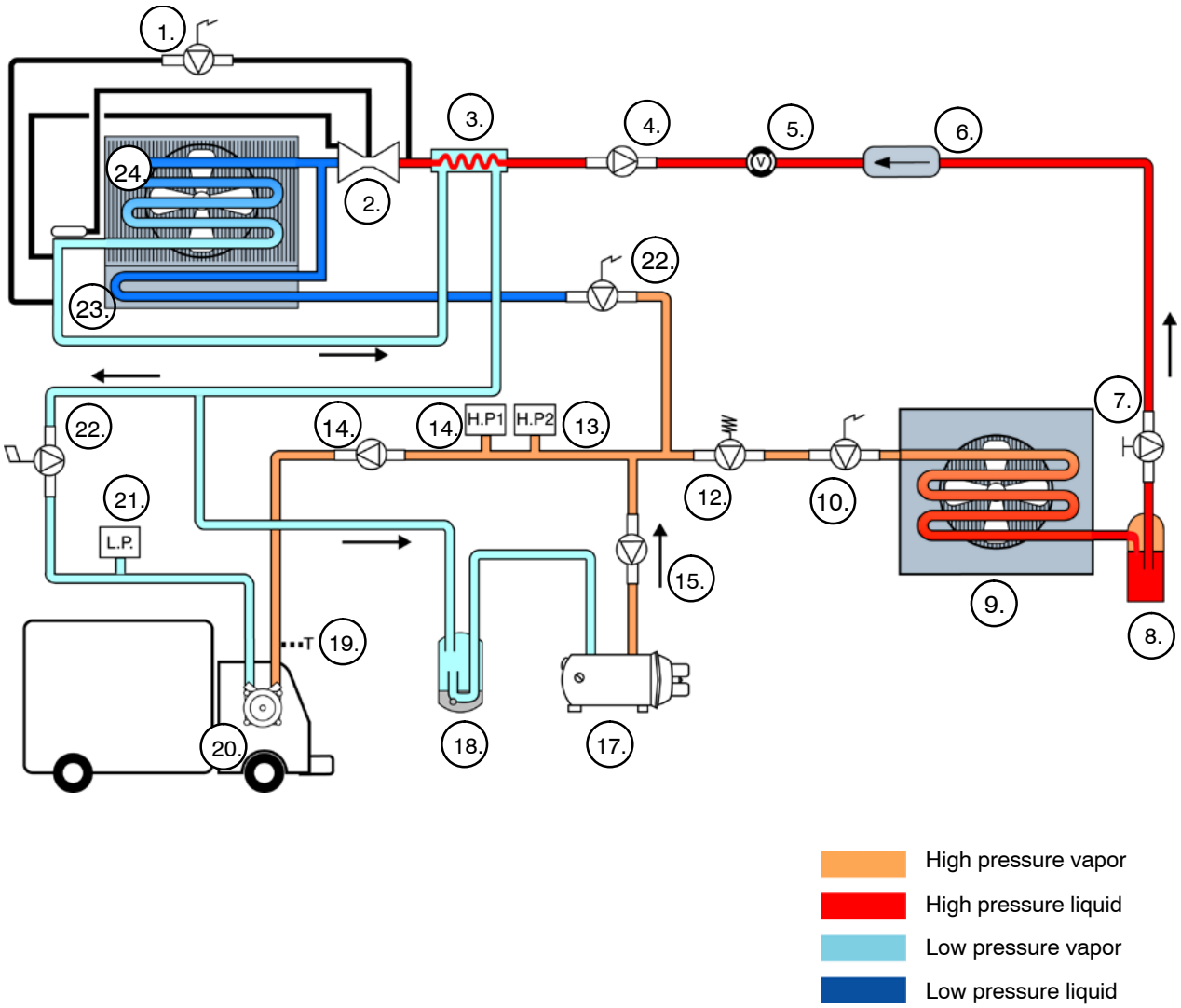
2.12 REFRIGERANT CIRCUIT DURING HEAT AND DEFROST (SEE FIGURE 2-16, FIGURE 2-17, FIGURE 2-19, FIGURE 2-20, FIGURE 2-22, FIGURE 2-23, FIGURE 2-25 & FIGURE 2-26)

When refrigerant vapor is compressed to a high pressure and temperature in a compressor, the mechanical energy necessary to operate the compressor is transferred to the gas it is being compressed. This energy is refereed to as the ”heat of compression ” and is used as the source of heat during the defrost and heating mode.

Case 1 : With condenser closing solenoid option. When the microprocessor activates heating or defrost, the hot gas HGS1 (two-way) solenoid energizes, and (if HP2 is open) the condenser closing solenoid HGS2 energizes, closing the port to the condenser and opening a port which allows heated refrigerant vapor to flow directly to the evaporator coil.

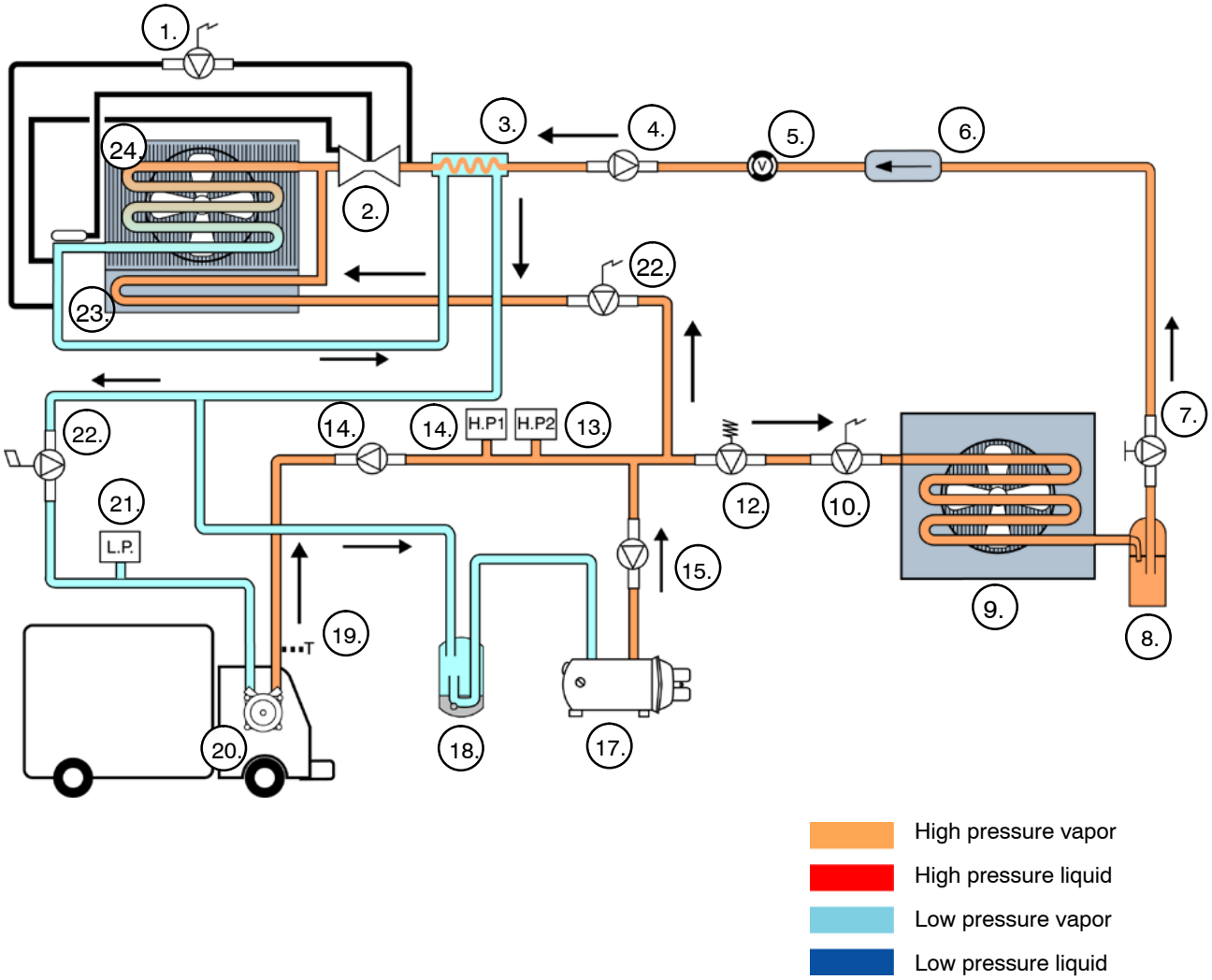
Case 2 : Without condenser closing solenoid option. When the microprocessor activates heating or defrost, the hot gas solenoid HGS1 (two-way) energizes, opening a port which allows heated refrigerant vapor to flow directly to the evaporator coil.

The main difference between heating and defrosting is that, when in heating mode all the evaporator fans continue to run, blowing the air around the heated coils to heat the product. When defrosting, the evaporator fans stop, allowing the heated vapor to defrost any ice build-up there may be.



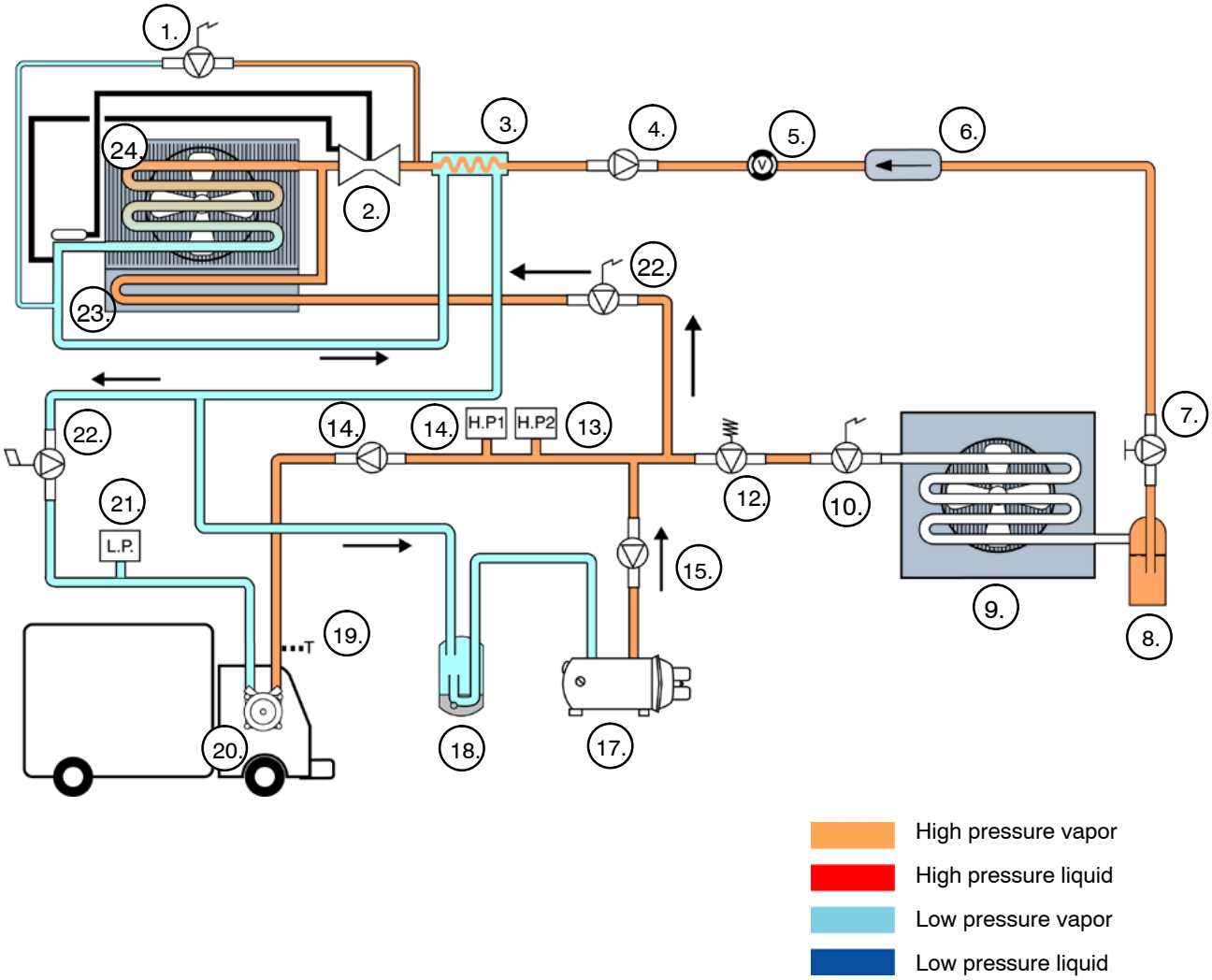
1. Liquid injection valve (BPV)
2. Thermostatic expansion valve
3. Heat exchanger **(for Xarios 200 only)**
4. Check valve (option)
5. Sight glass
6. Filter drier
7. Shut-off valve
8. Receiver
9. Condenser
10. Condenser closing valve (HGS2) – normally open (option)
11. Relief valve (RV)
12. Control pressure switch (HP2)
13. High pressure switch (HP1)
14. Road discharge check valve
15. Standby discharge check valve
16. Standby compressor
17. Accumulator
18. Klixon (BPT) (for liquid injection valve)
19. Road compressor
20. Low pressure switch (LP)
21. Starting valve
22. Hot gas valve (HGS1) (normally closed)
23. Defrost element
24. Evaporator

Figure 2-15 XARIOS 150/200: Cooling Cycle



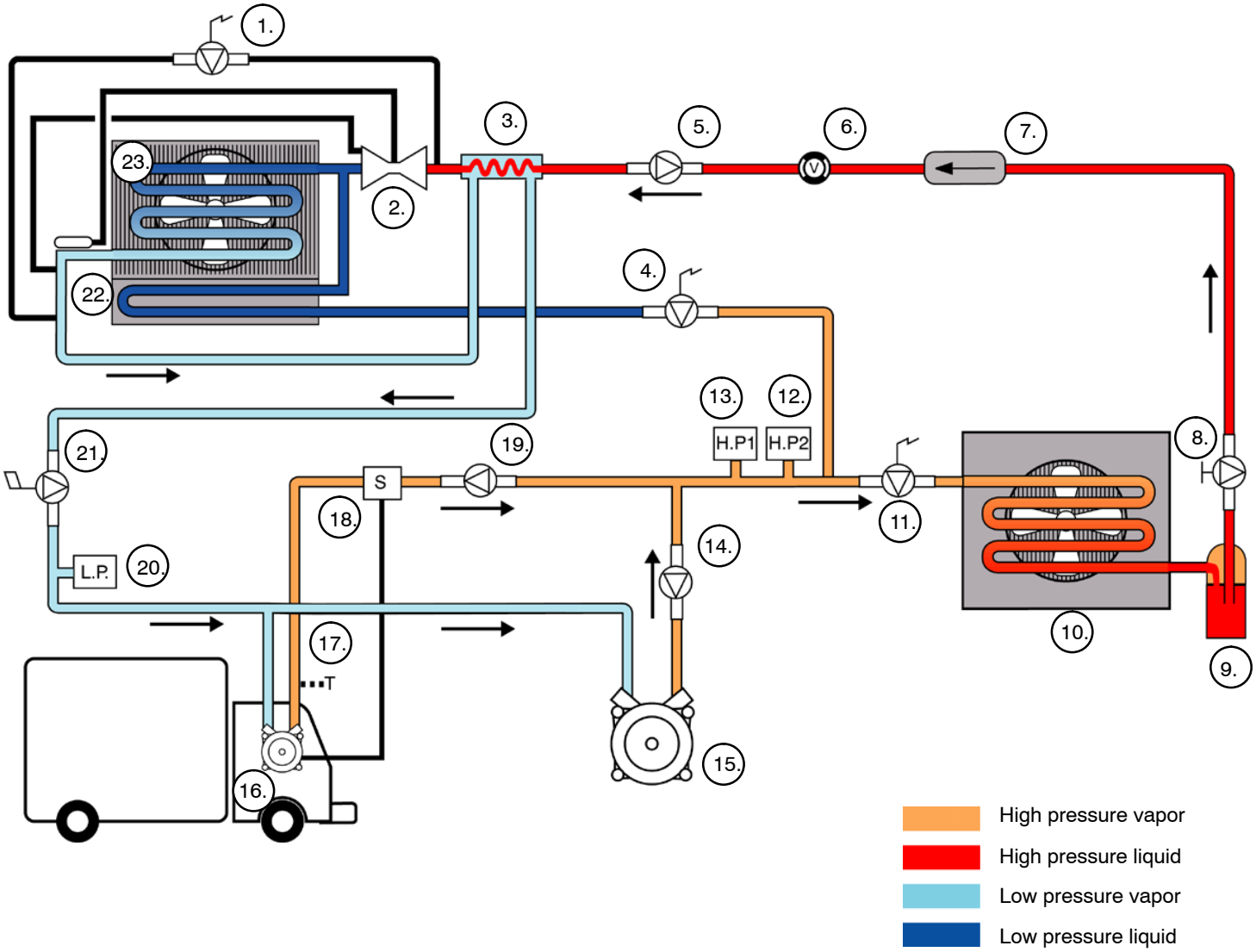
1. Liquid injection valve (BPV)
2. Thermostatic expansion valve
3. Heat exchanger **(for Xarios 200 only)**
4. Check valve (option)
5. Sight glass
6. Filter drier
7. Shut-off valve
8. Receiver
9. Condenser
10. Condenser closing valve (HGS2) – normally open (option)
11. Relief valve (RV)
12. Control pressure switch (HP2)
13. High pressure switch (HP1)
14. Road discharge check valve
15. Standby discharge check valve
16. Standby compressor
17. Accumulator
18. Klixon (BPT) (for liquid injection valve)
19. Road compressor
20. Low pressure switch (LP)
21. Starting valve
22. Hot gas valve (HGS1) (normally closed)
23. Defrost element
24. Evaporator

Figure 2-16 XARIOS 150/200: Heating and defrost Cycle – over 22 bar



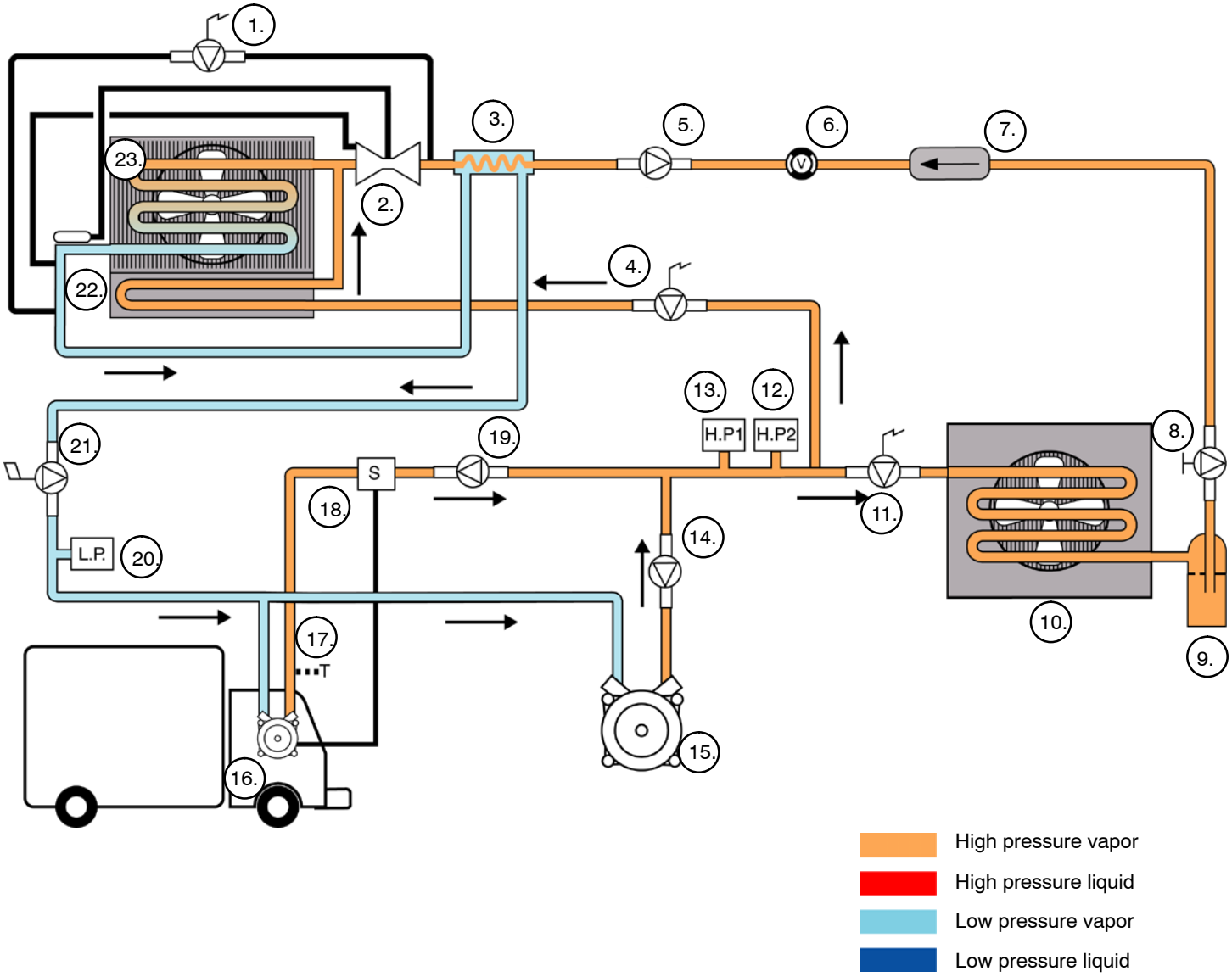
1. Liquid injection valve (BPV)
2. Thermostatic expansion valve
3. Heat exchanger **(for Xarios 200 only)**
4. Check valve (option)
5. Sight glass
6. Filter drier
7. Shut-off valve
8. Receiver
9. Condenser
10. Condenser closing valve (HGS2) – normally open (option)
11. Relief valve (RV)
12. Control pressure switch (HP2)
13. High pressure switch (HP1)
14. Road discharge check valve
15. Standby discharge check valve
16. Standby compressor
17. Accumulator
18. Klixon (BPT) (for liquid injection valve)
19. Road compressor
20. Low pressure switch (LP)
21. Starting valve
22. Hot gas valve (HGS1) (normally closed)
23. Defrost element
24. Evaporator

Figure 2-17 XARIOS 150/200: Heating and defrost Cycle – under 17 bar



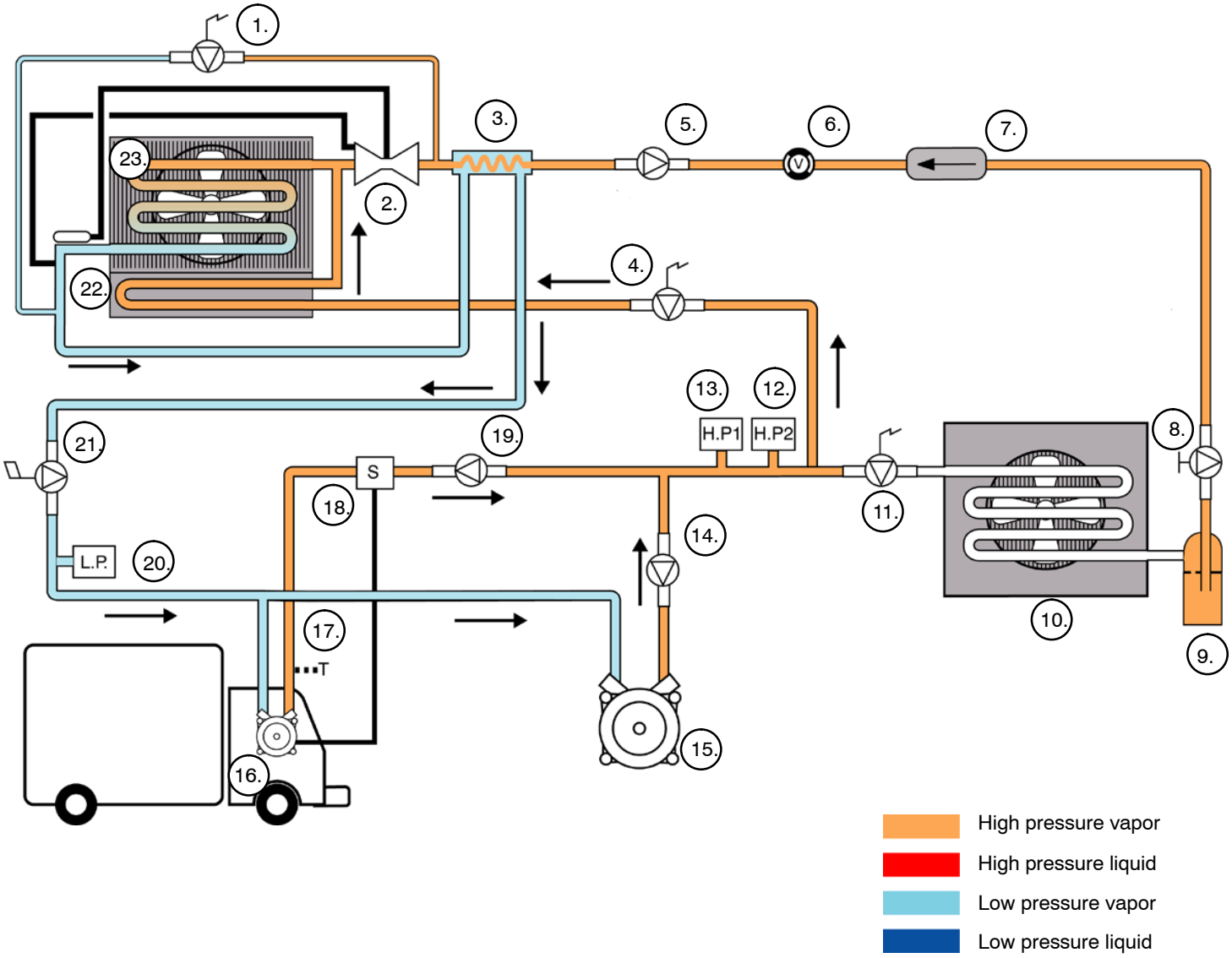
1. Liquid injection valve (BPV)
2. Thermostatic expansion valve
3. Heat exchanger
4. Hot gas valve (HGS1) – normally closed
5. Check valve (option)
6. Sight glass
7. Filter drier
8. Shut-off valve
9. Receiver
10. Condenser
11. Condenser closing valve (HGS2) normally open (option)
12. Pressure control switch (HP2)
13. High pressure switch (HP1)
14. Standby discharge check valve
15. Standby compressor
16. Road compressor
17. Klixon (BPT) (for liquid injection valve)
18. Oil separator
19. Road discharge check valve
20. Low pressure switch (LP)
21. CPR Starting valve
22. Defrost element
23. Evaporator

Figure 2-18 XARIOS 300/350: Cooling cycle



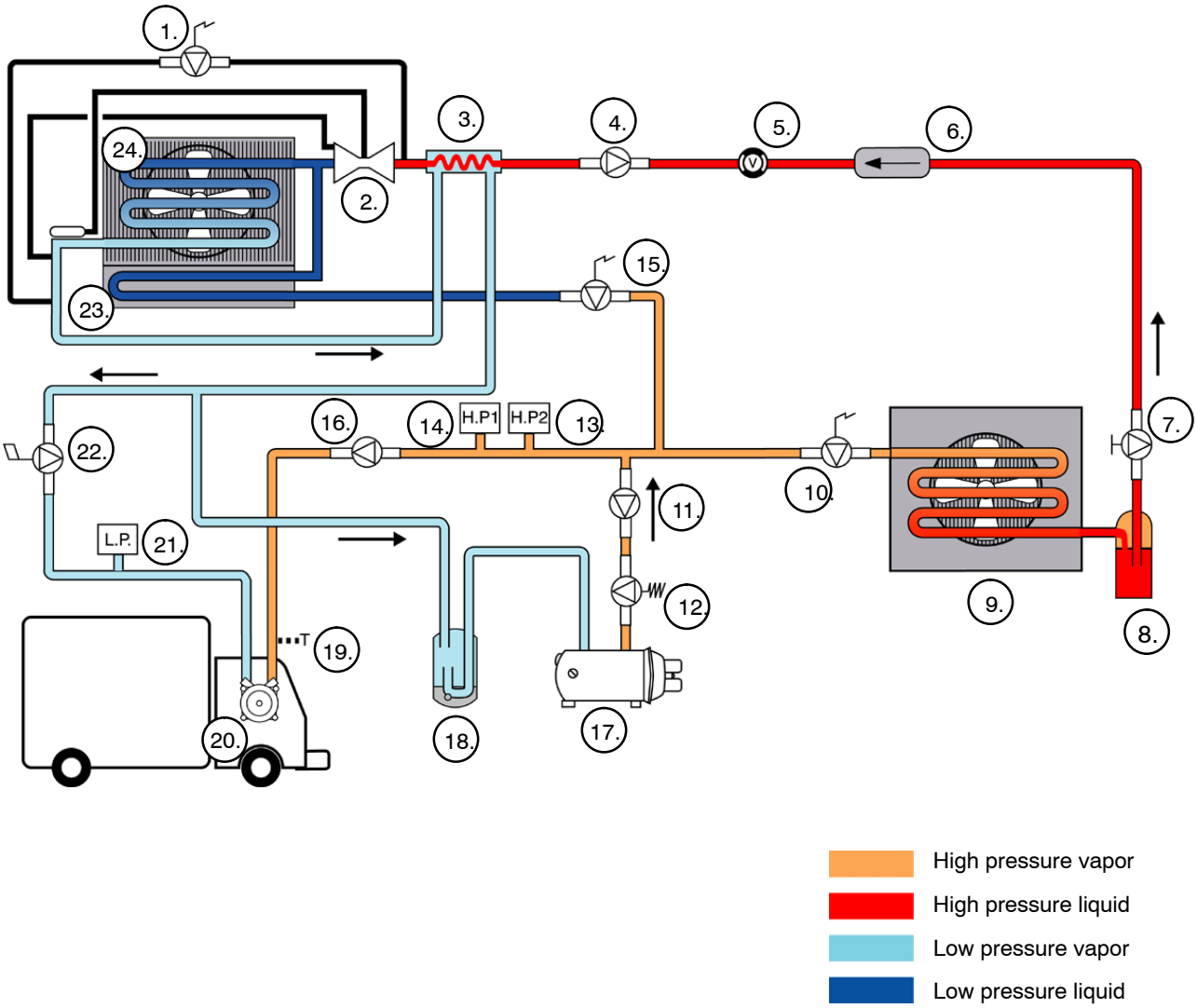
1. Liquid injection valve (BPV)
2. Thermostatic expansion valve
3. Heat exchanger
4. Hot gas valve (HGS1) – normally closed
5. Check valve (option)
6. Sight glass
7. Filter drier
8. Shut-off valve
9. Receiver
10. Condenser
11. Condenser closing valve (HGS2) – normally open (option)
12. Pressure control switch (HP2)
13. High pressure switch (HP1)
14. Standby discharge check valve
15. Standby compressor
16. Road compressor
17. Klixon (BPT) (for liquid injection valve)
18. Oil separator
19. Road discharge check valve
20. Low pressure switch (LP)
21. CPR Starting valve
22. Defrost element
23. Evaporator

Figure 2-19 XARIOS 300/350: Heating and defrost cycle – over 22 bar



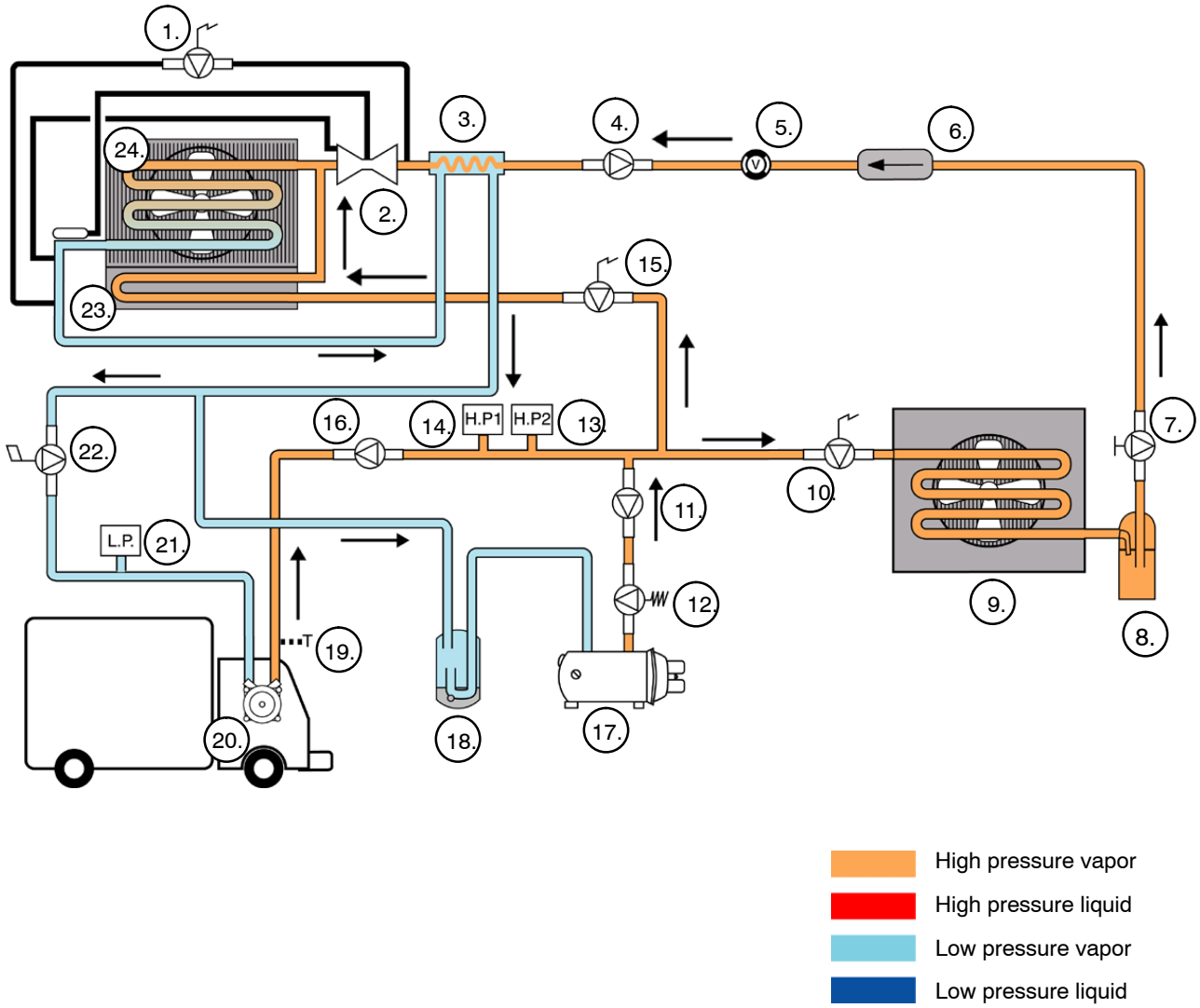
1. Liquid injection valve (BPV)
2. Thermostatic expansion valve
3. Heat exchanger
4. Hot gas valve (HGS1) – normally closed
5. Check valve (option)
6. Sight glass
7. Filter drier
8. Shut-off valve
9. Receiver
10. Condenser
11. Condenser closing valve (HGS2) – normally open (option)
12. Pressure control switch (HP2)
13. High pressure switch (HP1)
14. Standby discharge check valve
15. Standby compressor
16. Road compressor
17. Klixon (BPT) (for liquid injection valve)
18. Oil separator
19. Road discharge check valve
20. Low pressure switch (LP)
21. CPR Starting valve
22. Defrost element
23. Evaporator

Figure 2-20 XARIOS 300/350: Heating and defrost cycle – under 17 bar



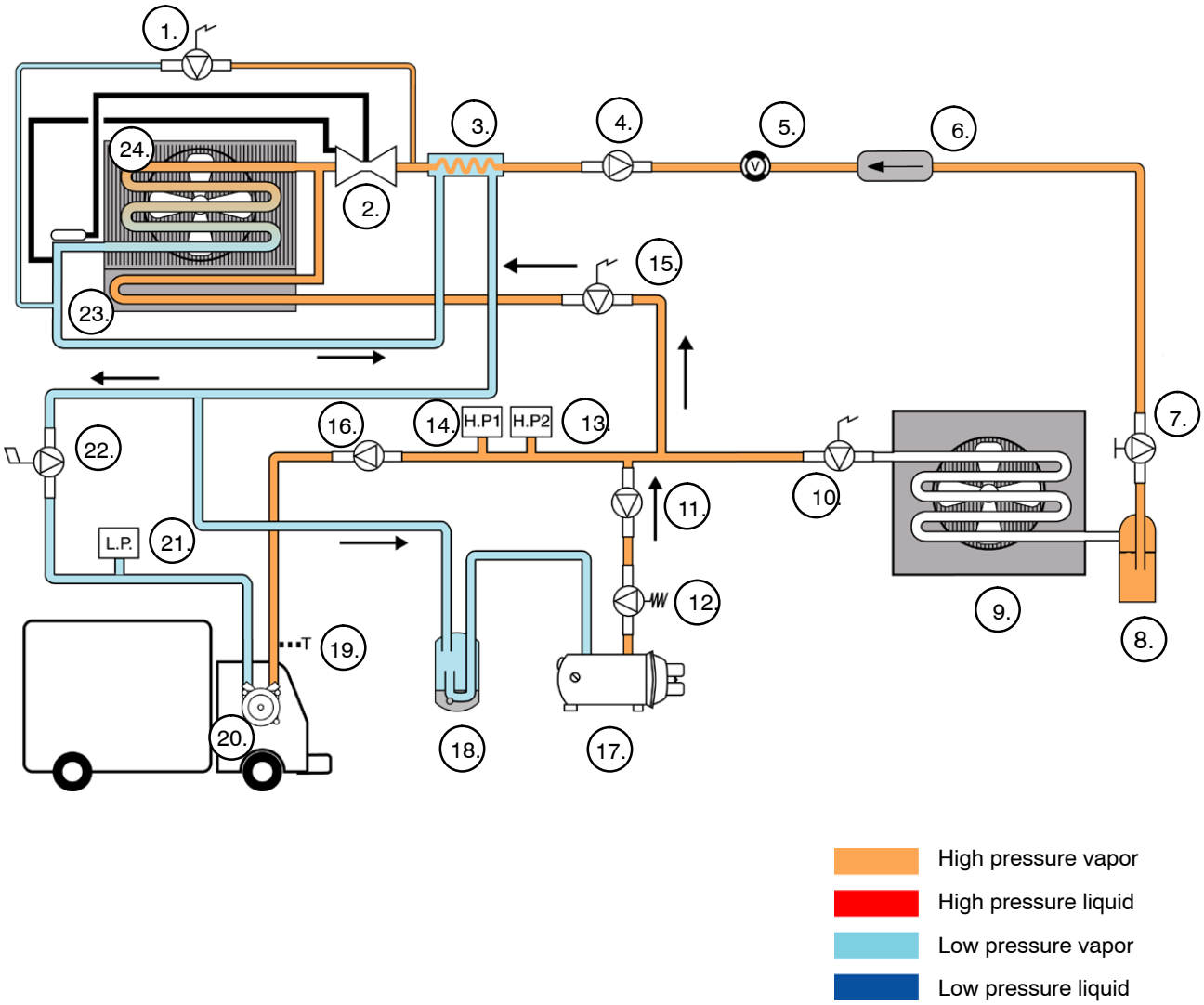
1. Liquid injection valve (BPV)
2. Thermostatic expansion valve
3. Heat exchanger
4. Check valve (option)
5. Sight glass
6. Filter drier
7. Shut-off valve
8. Receiver
9. Condenser
10. Condenser closing valve (HGS2) – normally open (option)
11. Standby discharge check valve
12. Relief valve RV (option)
13. Control pressure switch (HP2)
14. High pressure switch (HP1)
15. Hot gas valve (HGS1) – normally closed
16. Road discharge check valve
17. Standby compressor
18. Accumulator
19. Klixon (BPT) (for liquid injection valve)
20. Road compressor
21. Low pressure switch (LP)
22. CPR Starting valve
23. Defrost element
24. Evaporator

Figure 2-21 XARIOS 300ry: Cooling cycle



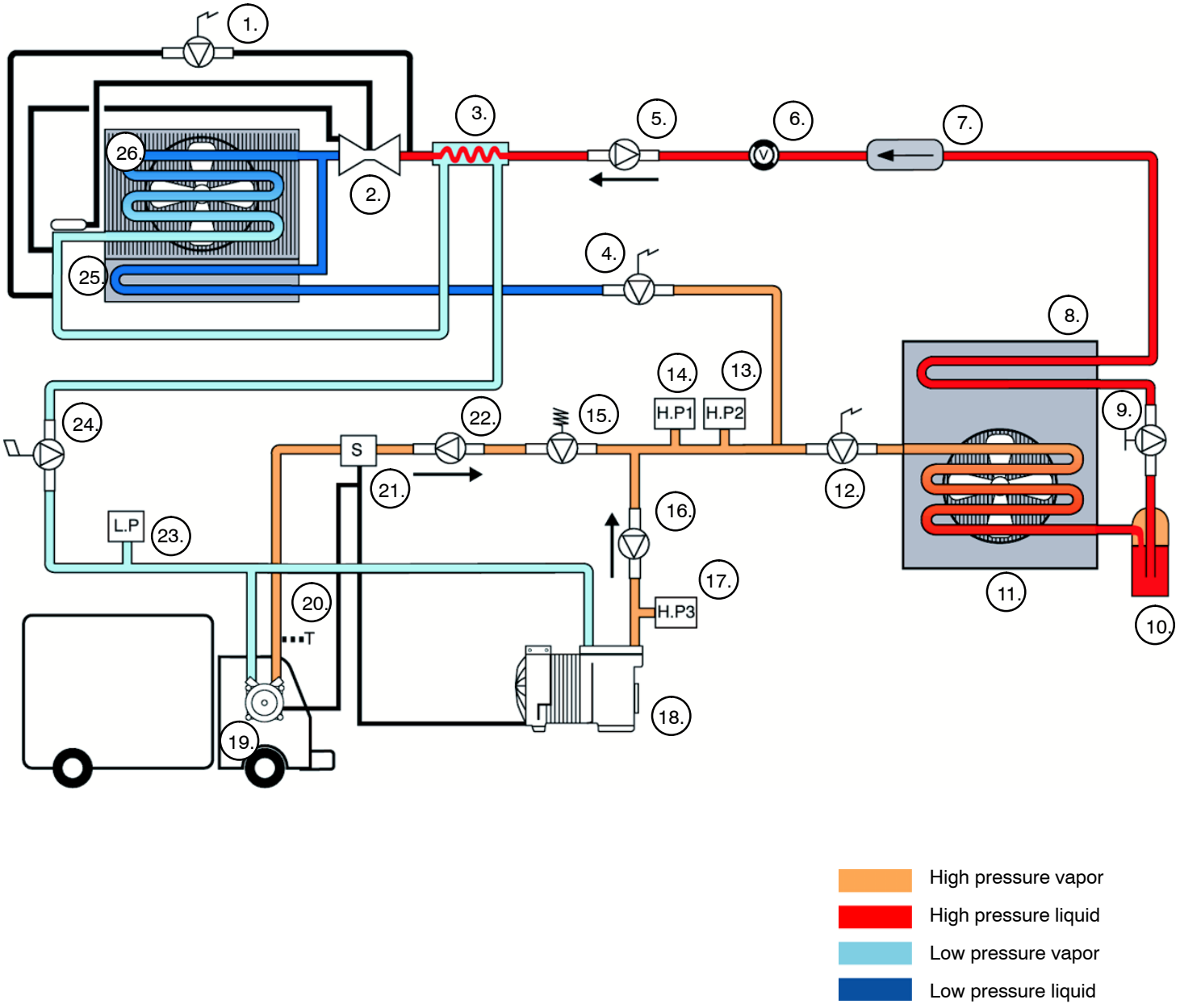
1. Liquid injection valve (BPV)
2. Thermostatic expansion valve
3. Heat exchanger
4. Check valve (option)
5. Sight glass
6. Filter drier
7. Shut-off valve
8. Receiver
9. Condenser
10. Condenser closing valve (HGS2) – normally open (option)
11. Standby discharge check valve
12. Relief valve RV (option)
13. Control pressure switch (HP2)
14. High pressure switch (HP1)
15. Hot gas valve (HGS1) – normally closed
16. Road discharge check valve
17. Standby compressor
18. Accumulator
19. Klixon (BPT) (for liquid injection valve)
20. Road compressor
21. Low pressure switch (LP)
22. CPR Starting valve
23. Defrost element
24. Evaporator

Figure 2-22 XARIOS 300ry: Heating and defrost cycle – over 22 bar



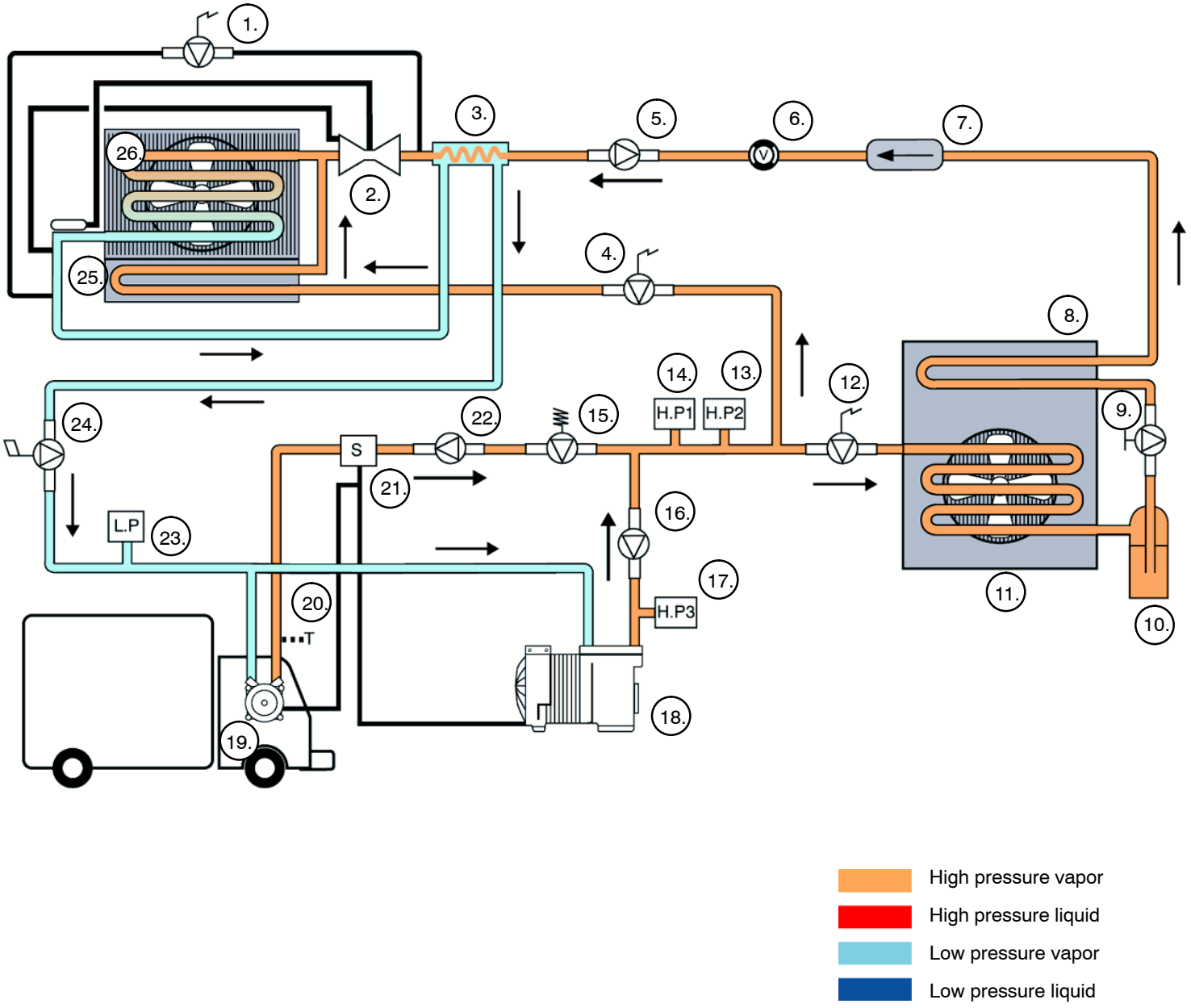
1. Liquid injection valve (BPV)
2. Thermostatic expansion valve
3. Heat exchanger
4. Check valve (option)
5. Sight glass
6. Filter drier
7. Shut-off valve
8. Receiver
9. Condenser
10. Condenser closing valve (HGS2) – normally open (option)
11. Standby discharge check valve
12. Relief valve RV (option)
13. Control pressure switch (HP2)
14. High pressure switch (HP1)
15. Hot gas valve HGS1) – normally closed
16. Road discharge check valve
17. Standby compressor
18. Accumulator
19. Klixon (BPT) (for liquid injection valve)
20. Road compressor
21. Low pressure switch (LP)
22. CPR Starting valve
23. Defrost element
24. Evaporator

Figure 2-23 XARIOS 300ry: Heating and defrost cycle – under 17 bar



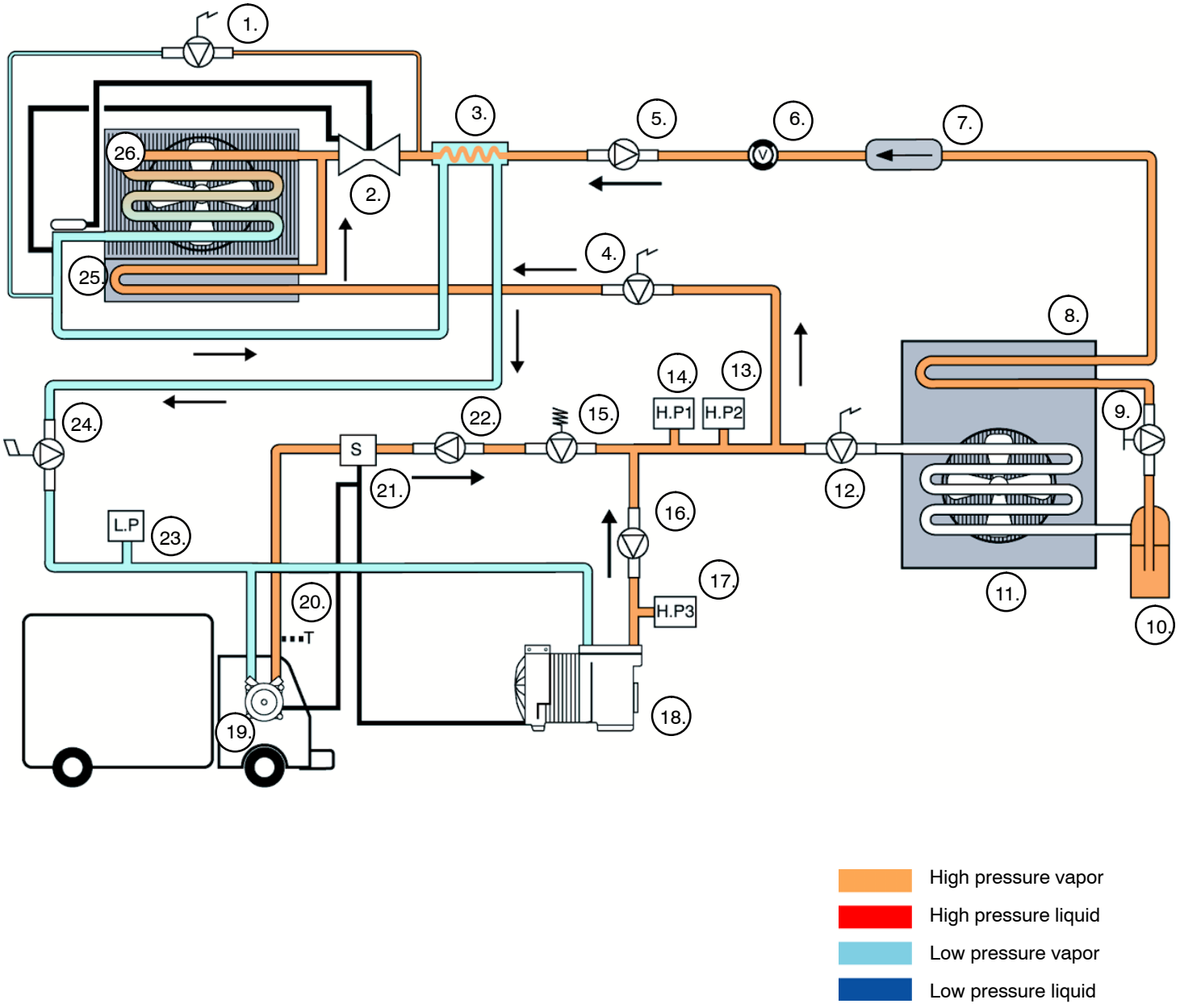
1. Liquid injection valve (BPV)
2. Thermostatic expansion valve
3. Heat exchanger
4. Hot gas valve (HGS1) – normally closed
5. Check valve (option for Xarios 400)
6. Sight glass
7. Filter drier
8. Subcooler
9. Shut-off valve
10. Receiver
11. Condenser
12. Condenser closing valve (HGS2) – normally open (option for Xarios 400)
13. Pressure control switch (HP2)
14. High pressure switch (HP1)
15. Relief valve
16. Standby discharge check valve
17. Standby high pressure switch (HP3)
18. Standby compressor
19. Road compressor
20. Klixon (BPT) (for liquid injection valve)
21. Oil separator
22. Road discharge check valve
23. Low pressure switch (LP)
24. CPR Starting valve
25. Defrost element
26. Evaporator

Figure 2-24 XARIOS 400/500: Cooling cycle



1. Liquid injection valve (BPV)
2. Thermostatic expansion valve
3. Heat exchanger
4. Hot gas valve (HGS1) – normally closed
5. Check valve (optional for Xarios 400)
6. Sight glass
7. Filter drier
8. Subcooler
9. Shut-off valve
10. Receiver
11. Condenser
12. Condenser closing valve (HGS2) – normally open (option for Xarios 400)
13. Pressure control switch (HP2)
14. High pressure switch (HP1)
15. Relief valve
16. Standby discharge check valve
17. Standby high pressure switch (HP3)
18. Standby compressor
19. Road compressor
20. Klixon (BPT) (for liquid injection valve)
21. Oil separator
22. Road discharge check valve
23. Low pressure switch (LP)
24. CPR Starting valve
25. Defrost element
26. Evaporator

Figure 2-25 XARIOS 400/500: Heating and defrost cycle – over 22 bars



1. Liquid injection valve (BPV)
2. Thermostatic expansion valve
3. Heat exchanger
4. Hot gas valve (HGS1) – normally closed
5. Check valve (optional for Xarios 400)
6. Sight glass
7. Filter drier
8. Subcooler
9. Shut-off valve
10. Receiver
11. Condenser
12. Condenser closing valve (HGS2) – normally open (option for Xarios 400)
13. Pressure control switch (HP2)
14. High pressure switch (HP1)
15. Relief valve
16. Standby discharge check valve
17. Standby high pressure switch (HP3)
18. Standby compressor
19. Road compressor
20. Klixon (BPT) (for liquid injection valve)
21. Oil separator
22. Road discharge check valve
23. Low pressure switch (LP)
24. CPR Starting valve
25. Defrost element
26. Evaporator

Figure 2-26 XARIOS 400/500: Heating and defrost cycle – under 17 bars

SECTION 3

OPERATION

3.1 CONTROL AND STARTING UP

Evaporator motor : During the starting mode, the motor speed increases continuously from 0 to 2100 rpm in 30 seconds for 12V unit and 12 seconds for 24V unit.

Start–up equalization : The hot gas valve is energized for few seconds before and after the compressor start.

3.1.1 On road

Check the belt tension of the compressor drive belts.

Start-up and control of box temperature

Start the vehicle engine

	Press the ON key to start the unit (start-up is time-delayed for 40 seconds). The digital display of the cab command displays the box temperature.
	Check the temperature set-point is correct by pressing the SET key; the set-point temperature is highlighted on the digital display.

Enter a new set-point if necessary (see temperature set-point adjustment).

In the event of difficulty on start-up, check that :

The road fuses have not blown.

The temperature selected by the cab command has not been affected.

Unit shut-down

	Turn off the ignition key or press the OFF key.

3.1.2 On standby (road / standby version)

VERY IMPORTANT

The unit must be shut–down to connect or disconnect the standby supply cable.

Before start-up, check :

- On the power network :

Check that the type of current corresponds to the characteristics of the unit (see section 1.8).

- On the power unit :

Connect the unit to the power network.

Start-up and box temperature control

	Press the ON key to start the unit (start-up is time-delayed for 40 seconds). The digital display of the cab command displays the box temperature.
	Check the temperature set-point is correct by pressing the SET key; the set-point temperature is highlighted on the digital display.

Enter a new set-point if necessary (see temperature set-point adjustment).

Unit shut-down

	Press the OFF key.

If you have difficulty in starting up, check:

The set-point temperature selected on the cab command has not been reached.

The standby fuses have not blown.

COOLING

There are two control ranges, Frozen and Perishable. The frozen range is active with set points at or below -12°C (+10°F) and the Perishable range is active at set points above -12°C (+10°F).

The controller automatically selects the mode necessary to maintain box temperature at set point.

HEATING

See section 2.12 for a description of the heating cycle.

The unit will only heat when the controller is set above -12°C (+10°F) as the heat relays are electronically locked out with set points at or below -12° (+10°F)

The microprocessor automatically selects the mode necessary to maintain box temperature at set point. In pulldown the heating modes are as follows (Figure 3-1 and Figure 3-2) :

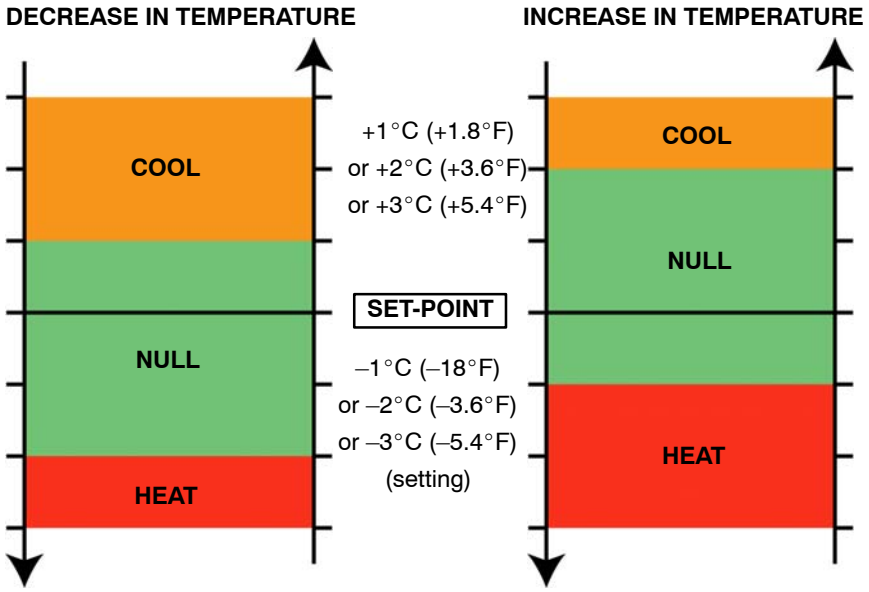
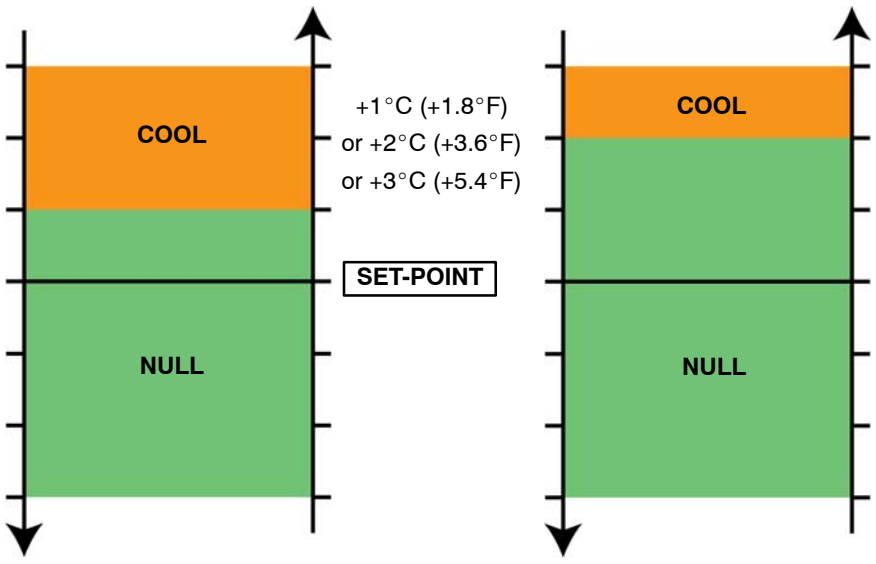


Figure 3-1 Thermostat operating sequence Standby or road operation- Set-point higher than –12°C (+10°F)



NOTE : The thermostat inhibits heat mode when it is set to a temperature lower than -12°C (+ 10°F).

Figure 3-2 Thermostat operating sequence Standby or road operation- Set-point lower than –12°C (+10°F)

DEFROST

See section 2.12 for a description of heat and defrost cycles.

DEFROST ON STANDBY

Defrost on standby operates the same way as the defrost on road operation (see section 2.12).

Table 3-1 XARIOS 150 / 200:Management of condenser and evaporator fan and heat and defrost valve (from version 3.01)

	EFM evaporator fan		CFM condenser fan	DWR drain water resistor	HGS2 heat valve	HGS1 defrost valve	HP2 pressure switch	DTT Klixon defrost
Cool	ON		OFF	OFF	OFF	OFF	OPEN	XX
	ON		ON 3 mn minimum	OFF	OFF	OFF	CLOSED	XX
Cycling	OFF	ON if forced by config.	OFF	OFF	OFF	OFF	OPEN	XX
	OFF		OFF	OFF	OFF	OFF	CLOSED	XX
Heating if set-point = or > -12°C	ON		OFF	OFF	ON	ON	OPEN	XX
	ON		ON if HGS2 = OFF + 1mn	OFF	OFF 1mn mini	ON	CLOSED	XX
Defrost	OFF		OFF	ON	ON	ON	OPEN	CLOSED
	OFF		ON if HGS2 = OFF + 1mn	ON	OFF 1 mn mini	ON	CLOSED	CLOSED

XX : indifferent position

Table 3-2 XARIOS 150 / 200: Management of condenser and evaporator fan and heat and defrost valve (until version 3.01)

	EFM evaporator fan		CFM condenser fan	DWR drain water resistor	HGS2 heat valve	HGS1 defrost valve	HP2 pressure switch	DTT Klixon defrost
Cool	ON		OFF	OFF	OFF	OFF	OPEN	XX
	ON		ON 3 mn minimum	OFF	OFF	OFF	CLOSED	XX
Cycling	OFF	ON if forced by config.	OFF	OFF	OFF	OFF	OPEN	XX
	OFF		OFF	OFF	OFF	OFF	CLOSED	XX
Heating if set-point = or > -12°C	ON		OFF	OFF	ON	ON	OPEN	OPEN
	OFF							CLOSED
	ON		ON if HGS2 = OFF + 1mn	OFF	OFF 1mn mini	ON	CLOSED	OPEN
	OFF							CLOSED
Defrost	OFF		OFF	ON	ON	ON	OPEN	CLOSED
	OFF		ON if HGS2 = OFF + 1mn	ON	OFF 1 mn mini	ON	CLOSED	CLOSED

XX : indifferent position

Table 3-3 XARIOS 300ry / 350 / 400 / 500: Management of condenser and evaporator fans and heat and defrost valves

FUNCTION	COOL		REGUL	HEAT** (without option)		HEAT** (Road, OHR1 installed)	HEAT** (Standby, OHS1 installed)		DEFROST	
EFM Evaporator fan motors 1, 2	ON		OFF (ON, following config)	ON		ON	ON		OFF	
CLHR/CLHS Compressor	ON		OFF	ON		OFF	ON (SCC)		ON	
DWR1 Drain water resistor	OFF		OFF	OFF		OFF	OFF		ON	
CFM Condenser fan motor	OFF	ON*	OFF	OFF	ON* if HP2 is ON > 1 min. if not OFF	OFF	OFF	ON* if HP2 is ON > 1 min. if not OFF	OFF	ON* if HP2 is ON > 1 min. if not OFF
HWP–HWV/ EHR Optional heating	OFF		OFF	N.A.		ON (HWV–HWP)	ON (EHR)		OFF	
HGS2 Heating valve	OFF		OFF	ON 1 min. mini		OFF	ON 1 min. mini for Xarios 300ry/350	OFF 1 min. mini for Xarios 400/500	ON 1 min. mini for Xarios 300ry/350	OFF 1 min. mini for Xarios 400/500
HGS1 Defrost valve	OFF		OFF	ON		OFF	ON		ON	
HP2 High pressure	OPENED	CLOSED	XX	OPENED	CLOSED	XX	OPENED	CLOSED	OPENED	CLOSED
DTTI Defrost klixon	XX		XX	XX		XX	XX		CLOSED	

* according to HP2 value (3 min. mini)

XX : indifferent position

** only if setpoint >–12°C

Minimum ”OFF” time (5 minutes) : Once the motor has cycled off, it will remain off for the minimum ”off time”. This prevents the motor from rapid cycling due to changes in air temperature. Air temperature in the box change rapidly, but it takes time for the product temperature to change.

SECTION 4

SERVICE

WARNING

Beware of unannounced starting of engine or standby motor caused by the unit thermostat or the start/stop cycle.

Personal Protective Equipment : before doing anything on this product, as explained in this manual.Always use safety precautions before doing any maintenance on the unit

safety glasses **, gloves** **,**

safety shoes **, safety clothes**

To disconnect the unit from its power sources :

- **disconnect the standby cable**
- **disconnect the negative battery cable and enclose it in the locked box (see procedure 98-60348-00)**

NOTE

To avoid damage to the earth's ozone layer, use a refrigerant recovery system whenever removing refrigerant.

4.1 UNIT MAINTENANCE

4.1.1 Unit maintenance schedules

Regular servicing is required in order to optimize the service life and reliability of your unit. Service operations are to be carried out according to the following schedule.

Table 4-1 Maintenance schedules

Hours	Service A	Service B	Service C	Service D
100	▪			
1000	▪	▪		
2000	▪	▪	▪	
3000	▪	▪		
4000	▪	▪	▪	▪
5000	▪	▪		
6000	▪	▪	▪	
7000	▪	▪		

Refrigerant : type R404A

Road compressor oil type: The road compressors are supplied with CARRIER POLYESTER (POE) oil. The presence of a sticker indicates that the oil-change has been correctly carried out in our CARRIER TRANSICOLD plant. Oils of PAG type are **strictly incompatible** with the operation of our units, **never use an oil other than that approved by CARRIER**.

Oil analysis :

On request we can analyze your compressor oil.

To do this, we send a small drum with a label on which you should indicate :

- the type of compressor,
- the lapse of time or mileage since the last oil change,
- the type of CARRIER equipment,
- the date of initial operation.

IMPORTANT

Before any operation requiring an intervention on the unit, check that :

- that the unit (cab command) is OFF.
- that it is impossible for the unit to automatically start up during maintenance.
- that the safety switch is OFF.

4.1.2 Description of maintenance operations

Service A	● Check the tension of the alternator belt(s). ● Check that the vehicle engine runs correctly at low speed and that the compressor kit is correctly tightened / belt tension. ● Check the tightness of bolts and screws and that the unit is correctly fastened onto the box.
Service B	● Clean the condenser and the evaporator. ● Replace the road & standby compressor belt(s) – **For the standby reciprocating compressor** ● Replace the filter-drier. ● Clean the TXV orifice filter. ● Check the standby compressor oil level. ● Check the operation of the cab command. ● Check the defrost – Cut-in – Fan shut-down – Cut-out – Defrost water drain ● Check the functionning of the emergency switch.
Service C	● Check the bearings of the belt tension pulleys and bearing of the mechanics kits. Change the spring if there is one. ● Change the shockmounts (if any) installed on the road compressor mounting kit. ● Check the operation of the evaporator and condenser fans. Change the condenser motor brushes. ● Change the compressor oil. Only use Ester oil (POE) approved by CARRIER. See the technical information sheets for the recommended quantities and types of oil.
Service D	● Change the removable fuses and capacitor (if any) in the control box.
Note : The evaporator of this unit is equipped with brushless fan motors which don't need to be maintained.	

4.2 BELT MAINTENANCE AND ADJUSTMENT

CAUTION

Beware of V-belt and belt-driven components as the unit may start automatically.

4.2.1 Belt tension gauge (road compressor)

A belt tension gauge provides an accurate and easy method of adjusting belts to their proper tension. Properly adjusted belts give long lasting and efficient service. Too much tension shortens belt and bearing life, and too little tension causes slippage and excessive belt wear. It is also important to keep belts and sheaves free of any foreign material which may cause the belts to slip.

The Belt Tension gauge can be used to adjust all belts. The readings which we specify for Carrier Transicold units are applicable only for our belts and application, as the tension is dependent on the size of the belt and distance between sheaves. When using this gauge, it should be placed as close as possible to the midpoint between two sheaves.

When installing a new V-belt the tension should be somewhat higher than specified and readjusted after allowing the unit to run for some time.

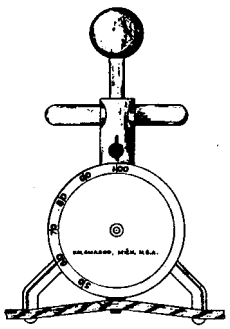


Figure 4-1 Road compressor belt tension

Belt tension depends on each kit. In each kit installation instruction, we indicate the belt tension (given with belt tension gauge CLAVIS, type 1–30–300 Hz).

4.3 REMOVING THE REFRIGERANT CHARGE

CAUTION

When working with refrigerant use safety glasses and gloves to avoid skin contact or burning.

Remember that hoses and copper tube can be hot points when the unit is functionning.

NOTE
Once the system is OPEN, it must be evacuated and deshydrated (see section 4.5.3).

Connect a refrigerant system to the unit to remove refrigerant charge. Refer to instruction provided by the manufacture of the refrigerant recovery system.

4.4 REFRIGERANT LEAK CHECKING

Once the recovery system is OPEN and repairs completed, leak check the unit by proceeding as follows:

f. The recommended procedure for finding leaks in a system is with a halide torch or electronic leak detector. Testing joints with soapsuds is satisfactory only for locating large leaks.

g. If system is without refrigerant, charge system with refrigerant to build up pressure between 2.1 to 3.5 bar (30 to 50 psig). Remove refrigerant cylinder and check for leak all connections.

NOTE
Important : only the correct refrigerant cylinder must be connected to pressurize the system. Any other gas or vapor will contaminate the system which will require additional purging and evacuation of the high side (discharge) of the system.

h. Remove refrigerant using a refrigerant recovery system and repair any leaks. Evacuate and dehydrate the unit. (Refer to section 4.5) Charge unit with refrigerant. (Refer to section 4.6)

4.5 EVACUATION AND DEHYDRATION

4.5.1 General

Moisture is the deadly enemy of refrigerant systems. The presence of moisture in a refrigeration system can have many undesirable effects. The most common are copper plating, acid sludge formation, ”freezing-up” of metering devices by free water, and formation of acids, resulting in metal corrosion.

4.5.2 Preparation

a. Evacuate and dehydrate only after pressure leak test. (Refer to section 4.4).

b. Essential tools to properly evacuate and dehydrate any system include a good vacuum pump (5cfm = 8m^3/h volume displacement, code 07-00176-01) and a good vacuum indicator such as a thermocouple vacuum gauge (vacuum indicator).

NOTE
Use of a compound gauge is not recommended because of its inherent inaccuracy.

c. Keep the ambient temperature above 15.6°C (60°F) to speed evaporation of moisture. if ambient temperature is lower than 15.6°C (60°F), ice might form before moisture removal is complete. Heat lamps or alternate sources of heat may be used to raise system temperature.

4.5.3 Evacuation and dehydration procedure

a. Remove refrigerant using a refrigerant recovery system.

b. The recommended method to evacuate and dehydrate the system is to connect three evacuation hoses to the vacuum pump and refrigeration unit as shown in Figure 4-3 (do not use standard service hoses as they are not suited for evacuation purposes). Also, as shown, connect an evacuation manifold with special evacuation hoses to the vacuum pump, to the electronic vacuum gauge and to the refrigerant recovery system.

c. Shut off the pump and check to see if the vacuum holds. This operation is to test the evacuation setup for leaks, repair if necessary.

d. Open the vacuum pump and electronic vacuum gauge valves, if they are not already open. Start the vacuum pump. Evacuate unit until the electronic vacuum gauge indicates 2000 microns. Close the electronic vacuum gauge and vacuum pump valves. Shut off the vacuum pump. Wait a few minutes to be sure the vacuum holds.

e. Break the vacuum with clean dry refrigerant. Use refrigerant that the unit calls for. Raise system pressure to approximately 2 psig.

f. Remove refrigerant using a refrigerant recovery system.

g. Repeat steps d. to f.

h. Evacuate unit to 500 microns. Close off vacuum pump valve and stop pump. Wait five minutes to see if vacuum holds. This checks for residual moisture and/or leaks.

i. With a vacuum still in the unit, the refrigerant charge may be drawn into the system from a refrigerant container on weight scales. The correct amount of refrigerant may be added by observing the scales (see section 4.6)

NOTE
Vacuum duration must be at least 8 hours.

1. Refrigerant recovery unit
2. Refrigerant cylinder
3. Evacuation manifold
4. Valve
5. Vacuum pump
6. Electronic vacuum gauge

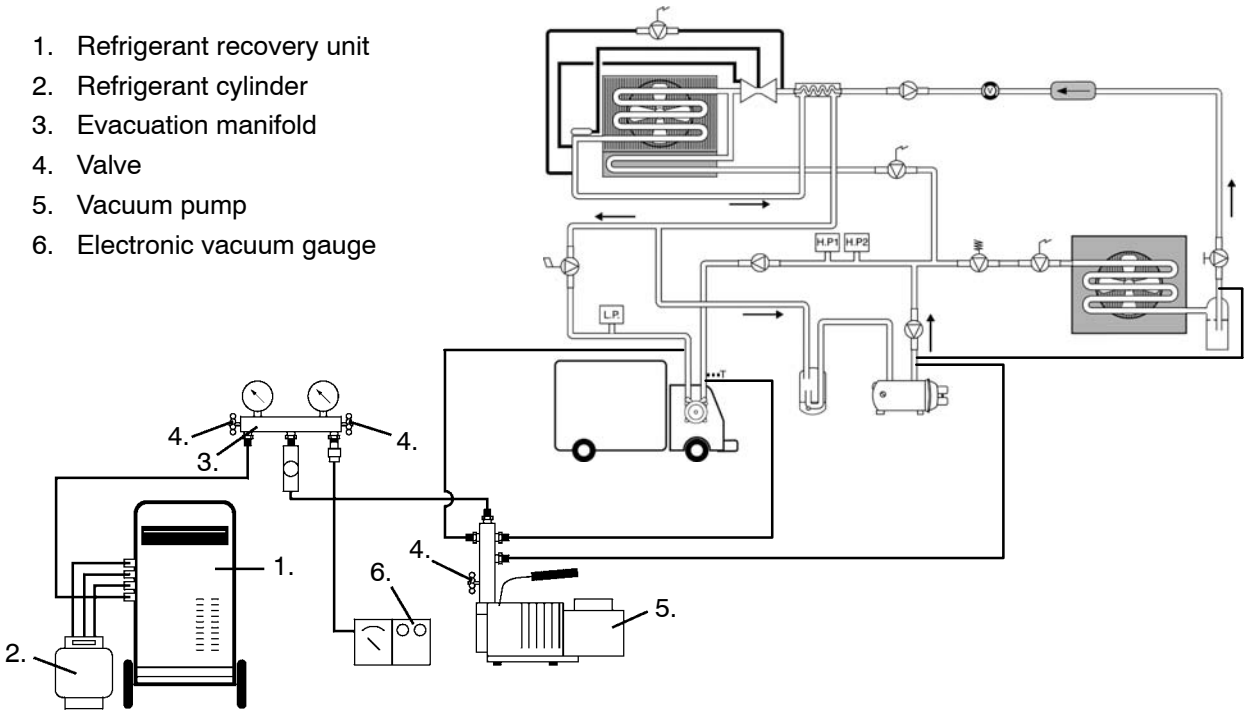


Figure 4-2 XARIOS 150/200: Vacuum pump connection

1. Refrigerant recovery unit
2. Refrigerant cylinder
3. Evacuation manifold
4. Valve
5. Vacuum pump
6. Electronic vacuum gauge

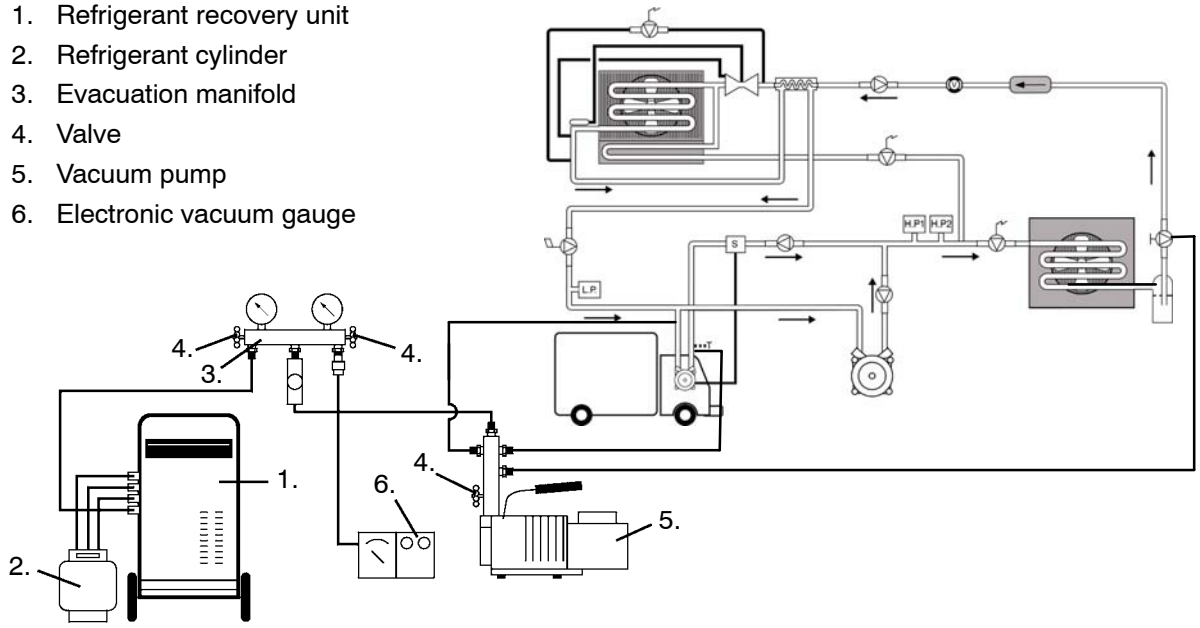


Figure 4-3 XARIOS 300ry/350: Vacuum pump connection

1. Refrigerant recovery unit
2. Refrigerant cylinder
3. Evacuation manifold
4. Valve
5. Vacuum pump
6. Electronic vacuum gauge

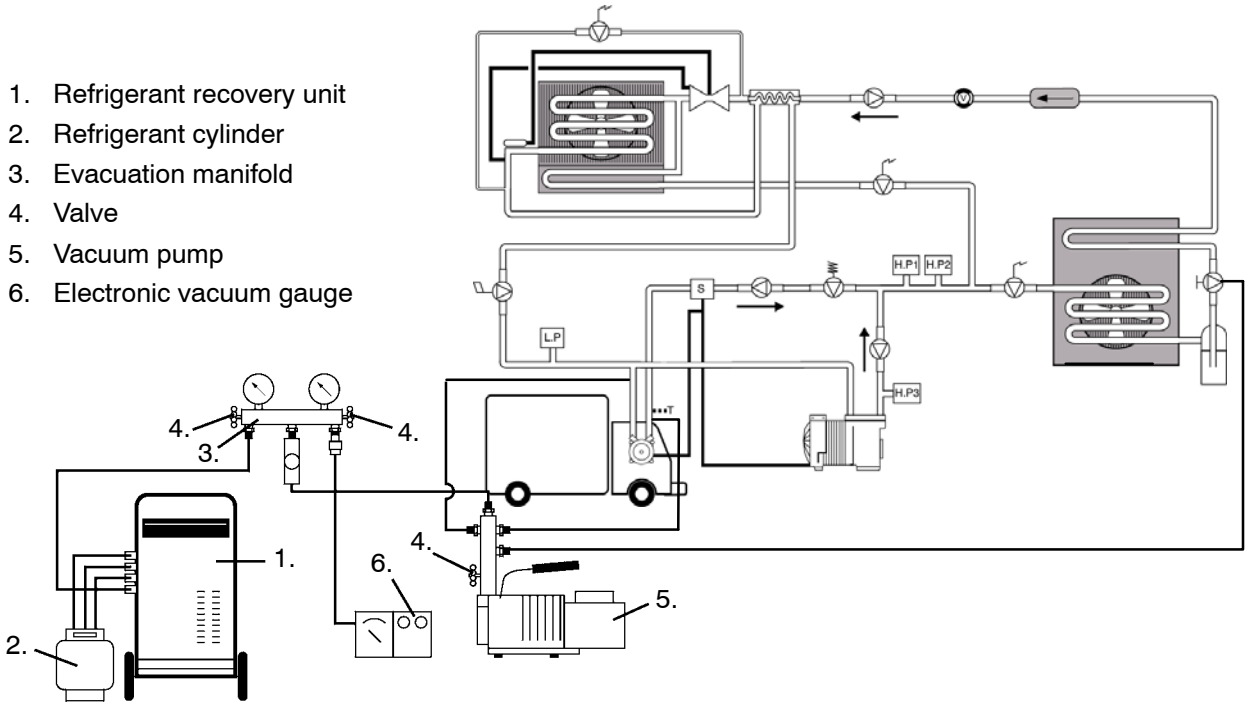


Figure 4-4 XARIOS 400/500: Vacuum pump connection

4.6 CHARGING THE REFRIGERATION SYSTEM

4.6.1 Installing a complete charge

a. Dry the refrigeration circuit and create a high vacuum (see section 4.5).

b. Place refrigerant cylinder on scale and connect charging line from cylinder to manifold. Purge charging line at outlet valve. Purge charging line at inlet manifold.

c. Note weight of refrigerant cylinder. Be sure that the unit is stopped during this operation.

d. Open liquid valve on refrigerant cylinder. Open king valve half way and allow the liquid refrigerant to flow into the unit until the correct weight of refrigerant has been added as indicated by scales. (Correct charge will be found in section 2.2).

NOTE
It is possible that all liquid may not be pulled into the circuit, as outlined in step (d) above. **In this case, close the cylinder valve front seat and start the unit. Refrigerant will accumulate in the receiver and liquid of the refrigerant cylinder will be succed by the compressor.**

e. When refrigerant cylinder weight (scale) indicates that the correct charge has been added, close the manifold valves.

f. Open the receiver valve back seat and follow the step 4.6.3.

4.6.2 Adding a partial charge

a. Place refrigerant cylinder on scale and note weight.

b. Connect charging line from the cylinder to the receiver valve. Purge the line at the cylinder valve.

c. Start the unit with the road compressor turning at 2400 rpm.

d. Front seat the receiver valve.

NOTE
The refrigerant R404A must be charged from liquid valve and not vapor. The refrigerant R404A is a blend. Charging by the vapor valve will change the properties of the refrigerant and affect cooling capacity.

e. Add refrigerant by small quantity.

f. Back seat the receiver valve.

g. Follow the step 4.6.3 and repeat if necessary from step c.

4.6.3 Checking the refrigerant charge

Start unit in cooling mode. Run approximately ten minutes. Partially block off air flow to condenser coil so discharge pressure rise to 22 bars (R404A).

The charge is correct if there are no bubbles at the liquid line sight glass.

4.7 REPLACING THE COMPRESSOR

a. Read carefully the following instructions, strict observance of these procedures are essential for operator safety.

- do not switch on compressor with terminal box open.
- remove terminal box cover only with power source disconnected.
- before compressor installation, slowly open the plug on the discharge valve and vent the nitrogen holding charge.
- ensure that suction and discharge valves are open before starting the compressor.

Wiring diagrams and further instructions inside the terminal box.

- do not touch the compressor shortly after stopping as surface temperatures will be dangerous.
- **do not operate the compressor with hydrocarbon gases.**

b. Evacuate the unit. Repeat the steps in section 4.3.

c. Installation

To install the compressor, reverse the procedure outlined when removing the compressor. Refer to section 2.5 for torque values.

Pump down the unit, see section 3.5 then charge system, see section 4.6.

4.8 CHECKING AND REPLACING FILTER-DRIER

Checking filter-drier

Check for any obstruction of the filter-drier by feeling the inlet and outlet connections of the liquid line on the filter cartridge. If the temperature of the outlet connection seems lower than the temperature of the inlet connection, replace the filter-drier.

Replacing the filter-drier

Remove the drier mounting clip, then replace the filter-drier.

4.9 CHECKING AND REPLACING HIGH PRESSURE CUTOUT SWITCH

4.9.1 Replacing high pressure cutout switch

– Remove defective switch.

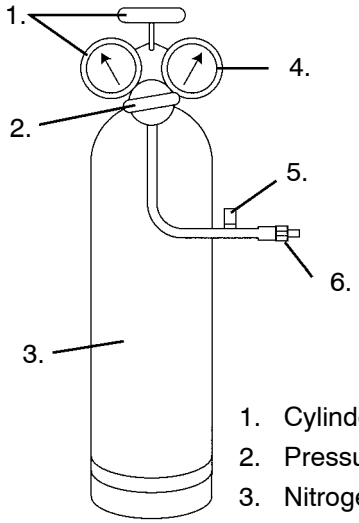
–Install the new switch.

NOTE
The seal is done by schraeder, it is not necessary to dehydrate or evacuate it.

4.9.2 Checking high pressure cutout switch

CAUTION

Do not use a nitrogen cylinder without a pressure regulator. Cylinder pressure is approximately 165 bar (2350 psi). Do not use oxygen in or near a refrigerant system as an explosion may occur. (See Figure 4-5).



1. Cylinder valve and gauge
2. Pressure regulator
3. Nitrogen cylinder
4. Pressure gauge (0 to 400 psig = 0 to 28 bars)
5. Bleed-off valve
6. 1/4 inch connection

Figure 4-5 Typical setup for testing high pressure switch HP1, HP2 & HP3

a. Remove switch as outlined in section 4.9.1.

b. Connect ohmmeter or continuity light across switch terminals. Ohmmeter will indicate resistance and continuity light will be lighted if switch is closed (HP1 / (HP3 for Xarios 400/500)) or open (HP2) after relieving pressure.

c. Connect switch to a cylinder of dry nitrogen (see Figure 4-5)

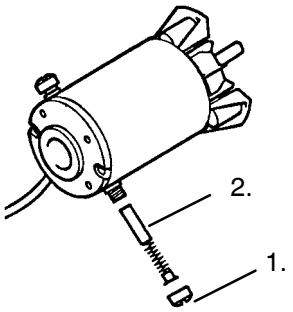
d. Set nitrogen pressure regulator higher than cut-out point on switch being tested. Pressure switch cut-in points are shown in sections 2.3.

e. Close valve on cylinder and open bleed-off valve.

f. Open cylinder valve. Slowly close bleed-off valve and increase pressure until the switch opens. If light is used, light will go out and if an ohmmeter is used, the meter will indicate open. Open pressure on gauge. Slowly open bleed-off valve (to decrease pressure) until switch closes (light will light or ohmmeter will move).

4.10 CHECKING AND REPLACING CONDENSER FAN MOTOR BRUSHES

The fan motor brushes should be checked periodically for cleanliness and wear to maintain proper operation of the fan motors.



1. Brush cap
2. Brush

Figure 4-6 Fan motor brushes

To check brushes proceed as follows :

a. With unit off and battery disconnected, remove brush cap (item 1; 2 per motor). See Figure 4-6.

b. Remove brushes (item 2; 2 per motor) and check the length of the brush. If the length is less than 1/4 inch (6 mm) the brushes should be replaced (after checking collector).

c. Blow out the brush holder with low pressure air to remove any carbon dust in the holder. This dust could prevent a good contact between the brushes and collector.

d. Remove the back cover of the motor and inspect the collector. If the commutator is heavily grooved, polish it using fine sandpaper; do not use abrasive paper. Wipe out any accumulation of greasy material using a clean rag dampened with solvent. Reassemble the motor; install new brushes and replace cap.

The evaporator fan motor is a brushless fan motor.

There is no maintenance on evaporator fan motor.

4.11 EVAPORATOR COIL-CLEANING

The use of recycled cardboard cartons is increasing. The recycled cardboard cartons create much more fiber dust during transport than ”new” cartons. The fiber dust and particles are drawn into the evaporator where they lodge between the evaporator fins. If the coil is not cleaned on a regular basis, sometimes as often as after each trip, the accumulation can be great enough to restrict air flow, cause coil icing, repetitive defrosts and loss of unit capacity. Due to the ”washing” action of normal defrost the fiber dust and particles may not be visible on the face of the coil but may accumulate deep within.

It is recommended to clean the evaporator coil on a regular basis, not only to remove cardboard dust, but to remove any grease oil film which sometimes coats the fins and prevents water from draining into the drain pan.

Cardboard fiber particles after being wetted and dried several times can be very hard to remove. Therefore, several washings may be necessary.

a. Spray coil with a mild detergent solution such as any good commercial-grade automatic dish washer detergent and let the solution stand for a few minutes. Reverse flush (opposite normal air flow) with clean water at mild pressure. A garden hose with spray nozzle is usually sufficient. Make sure drain lines are clean.

b. Run unit until defrost mode be initiated to check for proper draining from drain pan.

4.12 CONDENSER COIL-CLEANING

Remove all foreign material from the condenser coil by reversing the normal air flow. (Air is pulled in through the front and discharges over the engine.) Compressed air or water may be used as a cleaning agent. It may be necessary to use warm water mixed with any good commercial dishwasher detergent. Rinse coil with fresh water if a detergent is used.

4.13 HOT GAS (TWO-WAY) SOLENOID AND CONDENSER CLOSING SOLENOID (TWO-WAY)

4.13.1 Replacing solenoid coil

It is not necessary to pump the unit down to replace the coil (see Figure 4-7).

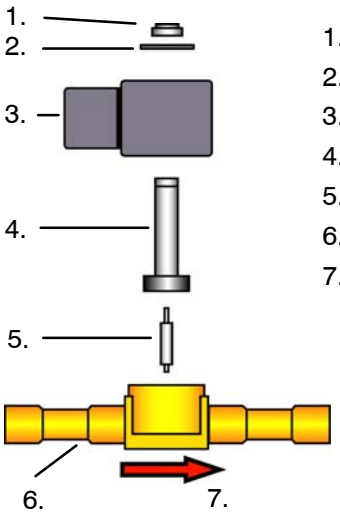
a. Remove coil snap cap, voltage plate and coil assembly. Disconnect leads and remove coil junction box if necessary.

b. Verify coil type, voltage and frequency. This information appears on the coil voltage plate and the coil housing.

c. Place new coil over enclosing tube and then install voltage plate and snap cap.

CAUTION

Do not damage or over tighten the enclosing tube assembly. Also make sure all parts are placed on the enclosing tube in proper sequence to avoid premature coil burn-out.



1. Snap cap
2. Voltage plate
3. Coil assembly
4. Enclosing tube
5. Plunger assembly
6. Valve body assembly
7. Way of the refrigerant flow

Figure 4-7 Hot gas (two-way) solenoid or Condenser closing solenoid (Two-way)

4.13.2 Replacing solenoid valve internal parts

If the hot gas solenoid is to be replaced, or if a service operation is scheduled on the internal components of the valve, the refrigerant must be evacuated.

a. Remove and store the refrigerant charge in an evacuated container (see section 4.3).

b. Remove coil snap cap, voltage cover and coil assembly. Remove the valve body head.

c. Check for foreign material in valve body.

d. Check for damaged plunger and O-ring. If O-ring is to be replaced, always put refrigerant oil on O-rings before installing.

e. Tighten enclosing tube. If the valve has been removed from the circuit, check for eventual leaks.

f. Install coil assembly, voltage cover and snap cap.

g. Evacuate and dehydrate the circuit.

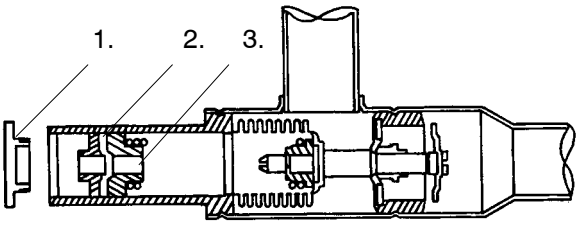
h. Install a complete refrigerant charge.

i. Start unit and check operation.

4.14 ADJUSTING THE ROAD COMPRESSOR PRESSURE REGULATING VALVE (CPR)

The CPR valve is not factory pre-set and need adjustment. It is necessary to adjust the valve during commissionning, proceed with the following outline :

When adjusting the CPR valve, the unit must be running in heating or defrost mode and at 2400rpm (compressor speed). This will ensure a suction pressure above the proper CPR setting.



1. Cap
2. Jam nut
3. Setting screw

Figure 4-8 Compressor pressure regulating valve

To adjust the CPR valve, proceed as follows :

a. Install a low-pressure gauge.

b. Remove cap (item 1) from CPR valve.

c. With an 8 mm Allen wrench, loosen the jam nut (Figure 4-8, item 2.).

d. Using the 8 mm Allen wrench, adjust the setting screw. To raise the suction pressure turn the setting screw (item 3.) clockwise; to lower the suction pressure, turn the setting screw counterclockwise. Refer to section 2.3 for CPR valve setting.

e. When the setting has been adjusted, tighten the jam nut securely against the setting screw (item 3.). This will prevent any movement of the setting screw due to vibrations in the unit. Replace the cap.

4.15 THERMOSTATIC EXPANSION VALVE

MOP expansion valve characteristics :

– Rule : in order to avoid the compressor overcharge, a MOP expansion valve (expansion valve with limited flow) is used.

– Operating : this kind of expansion valve can not open more than MOP setpoint. Any temperature increase of the sensor can not open more the expansion valve.

The thermal expansion valve is an automatic device which maintains constant superheat of the refrigerant gas leaving the evaporator regardless of suction pressure. The valve functions are: (a) automatic response of refrigerant flow to match the evaporator load and (b) prevention of liquid refrigerant entering the compressor. Unless the valve is defective, it requires adjustment, but maintenance must be done every year in order to clean the orifice filter.

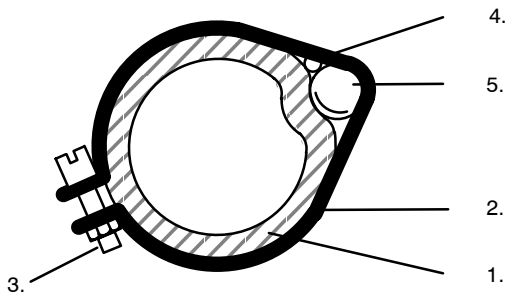
a. Replacing expansion valve

1. Remove refrigerant charge.
2. Remove insulation from expansion valve bulb and then remove bulb from suction line.
3. Loosen inlet nut and unbraze equalizer line and outlet line from expansion valve.
4. The thermal bulb is located below the center of the suction line. This area must be clean to ensure positive bulb contact. Strap thermal bulb to suction line and insulate both.
5. Braze the equalizer tubes to expansion valve.
6. Evacuate by placing vacuum pump on suction and receiver tank service valve.
7. Recharge unit.
8. Check superheat (see section 2.3).

b. Measuring superheat

NOTE
The expansion valve and bulb location are shown in Figure 4-9.

1. Remove insulation from expansion valve bulb and suction line.
2. Loosen one TXV bulb clamp and make sure area under clamp (above TXV bulb) is clean.
3. Place thermocouple above (parallel) TXV bulb and then secure loosened clamp making sure both bulbs are firmly secured to suction line as shown in Figure 4-9.



1. Suction line (end view)
2. TXV bulb clamp
3. Nut and bolt (clamp)
4. Thermocouple
5. TXV bulb

Figure 4-9 Thermostatic expansion valve bulb and thermocouple

4. Connect an accurate gauge to the ¼" port on the suction service valve.
5. Run unit until stabilized at -20°C (box temperature).
6. From the temperature/pressure chart (Table 4-2), determine the saturation temperature corresponding to the evaporator outlet pressure.
7. Note the temperature of the suction gas at the expansion valve bulb.
8. Subtract the saturation temperature determined in Step 7 from the average temperature measured in Step 6. The difference is the superheat of the suction gas. (**see section 1.3.f**)

4.16 MICROPROCESSOR

Although there is less danger of electrical static discharge ESD damage in the outdoor environment, where the processor is likely to be handled, proper board handling techniques should always be stressed. Boards should always be handled by their edges, in much the same way one would handle a photograph. This not only precludes the possibility of ESD damage, but also lowers the possibility of physical damage to the electronic components. Although the microprocessor boards are fairly rugged when assembled, they are more fragile when separated and should always be handled carefully.

When welding is required on the unit frame, or on the front area of the trailer, ALL wiring to the microprocessor MUST be disconnected. When welding is performed on other areas of the truck and van, the welder ground connection MUST be in close proximity to the area being welded. It is also a good practice to remove both battery cables before wedding on either the unit frame or the truck to prevent possible damage to other components such as the alternator and voltage regulator.

Table 4-2 Pressure – Temperature R404A	
Temperature (°C)	Vapor pressure (bar abs.)
-60	0.50
-58	0.57
-56	0.63
-54	0.70
-52	0.78
-50	0.86
-48	0.95
-46	1.04
-44	1.14
-42	1.25
-40	1.37
-38	1.50
-36	1.63
-34	1.78
-32	1.93
-30	2.11
-28	2.27
-26	2.48
-24	2.65
-22	2.85
-20	3.09
-18	3.32
-16	3.57
-14	3.83
-12	4.11
-10	4.40
-8	4.71
-6	5.03
-4	5.38
-2	5.73
0	6.11
2	6.50
4	6.92
6	7.35
8	7.80
10	8.28
12	8.77
14	9.29
16	9.83
18	10.39
20	10.98
22	11.59
24	12.22
26	12.89
28	13.57
30	14.29
32	15.03
34	15.80
36	16.61
38	17.44

Table 4-2 Pressure – Temperature R404A	
Temperature (°C)	Vapor pressure (bar abs.)
40	18.30
42	19.19
44	20.12
46	21.08
48	22.07
50	23.10
52	24.16
54	25.26
56	26.40
58	27.57
60	28.79

Table 4-3 Sensor Resistance (RAS)		
Temperature		**RAS**
°C	**°F**	**Resistance In Ohms**
–28.9	–20	165,300
–23.3	–10	117,800
–17.8	0	85,500
–12.2	10	62,400
– 6.7	20	46,300
– 1.1	30	34,500
0	32	32,700
4.4	40	26,200
10.0	50	19,900
15.6	60	15,300
21.1	70	11,900
25	77	10,000
26.7	80	9,300
32.2	90	7,300
37.8	100	5,800
43.3	110	4,700
48.9	120	3,800
90	194	915
100	212	680
130	266	301
150	302	186

SECTION 5

TROUBLESHOOTING

CAUTION

Under no circumstances should anyone attempt to service the microprocessor (see section 4.16). Should a problem develop with the microprocessor, contact your nearest Carrier Transicold dealer for replacement.

INDICATION / TROUBLE	POSSIBLE CAUSES	REFERENCE SECTION
5.1 REFRIGERATION		
5.1.1 Unit will not cool		
Compressor malfunction	Compressor drive defective Compressor defective	4.7 4.7
Refrigeration system	Defrost cycle has not terminated Abnormal pressure Hot gas (two-way) solenoid malfunction	5.1.5 5.1.6 5.1.11
5.1.2 Unit runs but has insufficient cooling		
Compressor	Compressor valves defective	4.7
Refrigeration system	Abnormal pressure Expansion valve malfunction No or restricted evaporator airflow	5.1.6 5.1.10 5.1.9
5.1.3 Unit operates long or continuously in cooling		
Box	Hot Load Defective box insulation or air leak	Insufficient pull down time Correct
Refrigeration system	Abnormal pressure Temperature controller malfunction	5.1.6 Figure 3-1 & Figure 3-2
Compressor	Defective	4.7
5.1.4 Unit will not heat or heating insufficient		
Refrigeration	Abnormal pressure Temperature controller malfunction Hot gas (two-way) solenoid malfunction	5.1.6 Figure 3-1 & Figure 3-2 5.1.11
Compressor	Compressor drive defective Compressor defective	4.7 4.7
5.1.5 Defrost malfunction		
Automatic defrost will not initiate	Defrost thermostats (DTT) open or defective Hog gas valve Electronic card malfunction	Replace Check operation Check defrost parameters
Manual defrost will not initiate	Microprocessor defective Defrost thermostats (DTT) open or defective	Replace Replace
Defrost cycle initiates but does not defrost	Hot gas (two-way) solenoid malfunction	5.1.11
Frequent defrost	Wet load	Check defrost parameters
Does not terminate or cycles on defrost	Defrost thermostats (DTT) shorted closed	Replace

INDICATION / TROUBLE	POSSIBLE CAUSES	REFERENCE SECTION
5.1.6 Abnormal pressure		
5.1.6.1 Cooling		
High discharge pressure	Condenser coil dirty Non-condensibles or refrigerant over-charge	4.12 Replace
Low discharge pressure	Compressor valves(s) worn or broken Hot gas (two-way) solenoid malfunction	4.7 5.1.11
High suction pressure	Compressor valves(s) worn or broken Hot gas (two-way) solenoid malfunction	4.7 5.1.11
Low suction pressure	Suction service valve partially closed Filter-drier partially plugged Low refrigerant charge Expansion valve malfunction No evaporator air flow or restricted air flow Excessive frost on coil	Open 4.8 4.6 5.1.10 5.1.9 Check
Suction and discharge pressures tend to equalize when unit is operating	Compressor valves defective Hot gas (two-way) solenoid malfunction	4.7 5.1.11
5.1.6.2 Heating		
High discharge pressure	Overcharged system Condenser fan of HP2 pressure switch defective Non-condensibles in system Condenser fan defective	4.6.3 4.9.2 Check Check
Low discharge pressure	Compressor valve(s) worn or broken Hot Gas -two-way valve malfunction	4.7 5.1.11
Low suction pressure	Refrigerant shortage Compressor pressure regulating valve malfunction	4.6 4.14
5.1.7 Abnormal noise		
Compressor	Loose mounting bolts Worn bearings Worn or broken valves Liquids lugging Insufficient oil	Tighten 4.7 4.7 5.1.10 Check / 4.7
Condenser or evaporator fan	Loose shroud Bearings defective Bent shaft	Check Check Check
5.1.8 Cab command malfunction		
Cab Command non-operational	Sensor defective Microprocessor malfunction Microprocessor/Cab command cable	4.16 4.16 Change
5.1.9 No evaporator air flow or restricted air flow		
Evaporator coil blocked	Frost on coil or dirty Fan motor(s) malfunction	Check Check
No or partial evaporator air flow	Evaporator fan loose or defective Evaporator fan rotating backwards Evaporator air flow blocked in box Fan motor(s) malfunction	Check Check Check Check

INDICATION / TROUBLE	POSSIBLE CAUSES	REFERENCE SECTION
5.1.10 Expansion valve malfunction		
Low suction pressure with high superheat	Low refrigerant charge External equalizer line plugged Ice formation at valve seat Wax, oil or dirt plugging valve or orifice Broken capillary Power assembly failure or partial Loss of element/bulb charge Superheat setting too high	4.4 / 4.6 Clean 4.5 4.15 4.15 Replace Replace 4.15
Low superheat and liquids lugging in compressor	Superheat setting too low External equalizer line plugged Pin and seat of expansion valve eroded or held open by foreign material	4.15 Open 4.15
Fluctuating suction pressure	Improper bulb location or installation Low superheat setting	4.15 4.15
High superheat	Expansion valve setting	Adjust
5.1.11 Malfunction hot gas (two-way) solenoid / expansion closure valve		
Valve does not function properly	No power to valve Improper wiring or loose connections Valve improperly assembled Coil or coil sleeve improperly assembled Movement of plunger restricted due to: a. Corroded or worn parts b. Foreign material lodged in valve c. Bent or dented enclosing tube	Check Check 4.13 4.13 4.13
Valve shifts but refrigerant continues to flow	Foreign material lodged under seat Defective seat	4.13 4.13
5.2 STANDBY COMPRESSOR MALFUNCTION		
Standby compressor fails to start	Motor contactor defective Motor Overload open Improper power supply Malfunction displayed on Cab Command 5-minute timer on standby	Replace Check/replace motor Check
Standby compressor starts, then stops	Motor Overload open High amperage draw	Check/replace motor Check

SECTION 6

EXTRACT FROM MATERIAL SAFETY DATA BULLETIN

6.1 POE OIL

1. PRODUCT AND COMPANY IDENTIFICATION

CARRIER TRANSICOLD INDUSTRIES
810 route de Paris
76520 FRANQUEVILLE ST PIERRE
FRANCE

4. FIRST AID MEASURES

EYE CONTACT :
flush thoroughly with water. If irritation occurs, call a physician.

SKIN CONTACT :
wash contact areas with soap and water. High pressure accidental injection through the skin requires immediate medical attention for possible incision, irrigation and/or debridement.

INHALATION :
not expected to be a problem.

INGESTION :
not expected to be a problem. However, if greater than 1/2 liter (pint) ingested, seek medical attention.

5. FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA :
carbon dioxide, foam, dry chemical and water fog

SPECIAL FIRE FIGHTING PROCEDURES :
water or foam may cause frothing. Use water to keep fire exposed containers cool. Water spray may be used to flush spills away from exposure. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

SPECIAL PROTECTIVE EQUIPMENT :
for fires in enclosed areas, fire fighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS :
none. Flash point C (F) : 232 (450) (ASTM D–92). Flammable limits – LEL : NA, UEL: NA.

NFPA HAZARD ID :
health : 0,
flammability : 1,
reactivity : 0

HAZARDOUS DECOMPOSITION PRODUCTS :
carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED :

small spills can be absorbed with fire retardant treated sawdust, diatomaceous earth, etc. Contain and remove larger spills for salvage or disposal according to applicable regulation.

ENVIRONMENTAL PRECAUTIONS :

prevent spills from entering storm sewers or drains and contact with soil.

PERSONAL PRECAUTIONS :

see section 8.

7. HANDLING AND STORAGE

STORAGE :

do not store in open or unlabelled containers. Store away from strong oxidizing agents or combustible material.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

VENTILATION :

no special requirements under ordinary conditions of use and with adequate ventilation.

RESPIRATORY PROTECTION :

no special requirements under ordinary conditions of use and with adequate ventilation.

EYE PROTECTION :

normal industrial eye protection practices should be employed.

SKIN PROTECTION :

no special equipment required. However, good personal hygiene practices should always be followed.

10. STABILITY AND REACTIVITY

HAZARDOUS DECOMPOSITION PRODUCTS :

carbon monoxide (in case of fire)

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL :

EVEN THOUGH THIS PRODUCT IS READILY BIODEGRADABLE, IT MUST NOT BE INDISCRIMINATELY DISCARDED INTO THE ENVIRONMENT.

This product is suitable for burning in an enclosed, controlled burner for fuel value and for recycling at an approved facility. In addition, it can be disposed of at an approved waste disposal facility. Land farming and processing through sewage treatment facilities may be available disposal options but necessary approvals must first be obtained from appropriate regulatory authorities. Specific characteristics of the waste at the time of disposal may affect the availability of the above options.

The complete data sheets are available in English and French from Carrier Transicold Industries on request.

6.2 FORANE R404A

1. PRODUCT AND COMPANY IDENTIFICATION

CARRIER TRANSICOLD INDUSTRIES
810 route de Paris
76520 FRANQUEVILLE ST PIERRE
FRANCE

Product name : Forane (R) 404A
Product synonym(s)

Chemical family : hydrofluorocarbons

Chemical formula : CF3CH2F/CF3CH2F/CF3CH3

Chemical name : 1,1,1,2-tetrafluoroethane (HFC-134a)/Pentafluoroethane (HFC-125)/ 1,1,1-trifluoroethane (HFC-143a).

2. COMPOSITION / INFORMATION ON INGREDIENTS

BLEND OF FORANE 125, 143a, 134a

This product is not hazardous to health as define by the European Union dangerous substances and preparations directives.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Colorless liquified gas with faint ether odor.

WARNING

LIQUID AND GAS UNDER PRESSURE, OVERHEATING AND OVERPRESSURIZING MAY CAUSE GAS RELEASE OF VIOLENT CYLINDER BURSTING. MAY DECOMPOSE ON CONTACT WITH FLAMES OR EXTREMELY HOT METAL SURFACES TO PRODUCE TOXIC AND CORROSIVE PRODUCTS. VAPOR REDUCES OXYGEN AVAILABLE FOR BREATHING AND IS HEAVIER THAN AIR. HARMFUL IF INHALED AND MAY CAUSE HEART IRREGULARITIES, UNCONSCIOUSNESS OR DEATH. LIQUID CONTACT WITH EYES OR SKIN MAY CAUSE FROSTBITE.

POTENTIAL HEALTH, EFFECTS

Skin contact and inhalation are expected to be the primary routes of occupational exposure to this material. As with most liquified gases, contact with the rapidly volatilizing liquid can cause frostbite to any tissue. High vapor concentrations are irritating to the eyes and respiratory tract and may result in central nervous system (CNS) effects such as headache, dizziness, drowsiness and, in severe exposure, loss of consciousness and death. The dense vapor of this material may reduce the available oxygen for breathing. Prolonged exposure to an oxygen-deficient atmosphere may be fatal. Inhalation may cause an increase in the sensitivity of the heart to adrenaline, which could result in irregular or rapid heartbeats. Medical conditions aggravated by exposure to this material include heart disease or compromised heart function.

4. FIRST AID MEASURES

EYE CONTACT

immediatly flush with plenty of water. Get medical attention if irritation persists.

SKIN CONTACT

flush exposed skin with lukewarm water (not hot), or use other means to warm skin slowly. Get medical attention if frostbitten by liquid or if irritation occures.

INGESTION

not applicable. Product is a gas at ambient temperatures.

INHALATION

remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. **DO NOT GIVE ADRENALINE, EPINEPHRIN OR SIMILAR DRUGS FOLLOWING EXPOSURE TO THIS PRODUCT.**

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

use extinguishing media appropriate to surrounding fire conditions.

FIRE FIGHTING INSTRUCTIONS

stop the flow of gas if possible. Use water spray on person making shut-off and on containers and cylinders. Fire fighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Bunker Gear) and self-contained breathing apparatus. Fire fighting equipment should be thoroughly decontaminated after use.

FIRE AND EXPLOSION HAZARDS

some mixtures of HCFCs and / or HFCs, and air or oxygen may be combustible if pressurized and exposed to extreme heat or flame.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR LEAK

use Halogen leak detector or other suitable means to locate leaks or check atmosphere. Keep upwind. Evacuate enclosed spaces and disperse gas with floor-level forced-air ventilation. Exhaust vapors outdoors. Do not smoke or operate internal combustion engines. Remove flames and heating elements.

7. HANDLING AND STORAGE

HANDLING

avoid breathing gas. Avoid contact with eyes, skin and clothing. Keep container closed. Use only with adequate ventilation. Do not enter confined spaces unless adequately ventilated.

STORAGE

do not apply direct flame to cylinder. Do not store cylinder in direct sun or expose it to heat above 48°C (120°F). Do not drop or refill this cylinder. Keep away from heat, sparks and flames.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EYE / FACE PROTECTION

where there is potential for eye contact, wear chemical gloggles and have eye flushing equipment available.

SKIN PROTECTION

wear appropriate chemical resistant protective clothing and chemical resistant gloves to prevent skin contact. Consult glove manufacturer to determine appropriate type glove material for given application. Rinse contaminated skin promptly. Wash contaminated clothing and clean protective equipment before reuse. Wash skin thoroughly after handling.

RESPIRATORY PROTECTION

avoid breathing gas. When airborne exposure limits are exceeded, use respiratory protection equipment appropriate to the material and / or its components (full facepiece recommended). For emergency and other conditions where exposure limit may be significantly exceeded, use an approved full face positive-pressure, self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply.

10. STABILITY AND REACTIVITY

INCOMPATIBILITY

avoid contact with strong alkali or alkaline earth metals, finely powdered metals such as aluminium, magnesium or zinc and strong oxidizers, since they may react or accelerate decomposition.

HAZARDOUS DECOMPOSITION PRODUCTS

thermal decomposition products include hydrogen fluoride, hydrogen chloride, carbon monoxide, carbon dioxide and chlorine.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL

recover, reclaim or recycle when practical. Dispose of in accordance with federal, state and local regulations.

Note : chemical additions to, processing of, or otherwise altering this material may take this waste management information incomplete, inaccurate, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or otherwise different from federal laws and regulations.

The complete data sheets are available in English and French from Carrier Transicold Industries on request.

SECTION 7

ELECTRICAL SCHEMATIC WIRING DIAGRAMS

This section contains Electrical Schematic Wiring Diagrams covering the Models listed in Table 2-1. The following general safety notices supplement the specific warnings and cautions appearing elsewhere in this manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered herein.

Model	Drawing #
XARIOS 150/200: Road – 12V/24V	62-60920
XARIOS 150/200: Road – 208/230/1/50Hz/60Hz	62-60921
XARIOS 150/200: Road – 400/3/50Hz	62-60922
XARIOS 300ry: Road/Standby – 230/1/50Hz	62-61348
XARIOS 300ry: Road/Standby – 400/3/50Hz	62-61349
XARIOS 350: Road version	62-60901
XARIOS 350: Road/Standby – 230/400/3/50Hz/60Hz	62-61345
XARIOS 350: Road/Standby – 230/1/50Hz	62-61346
XARIOS 350: Road/Standby – 208-230/1/60Hz	62-61347
XARIOS 400/500: Road version	62-60873
XARIOS 400/500: Road version 230V without electrical heating	62-60856
XARIOS 400/500: Road version 400V without electrical heating	62-60817
XARIOS 400/500: Road/standby – 208/230/1/50Hz/60Hz	62-60827

WARNING

Beware of unannounced starting of the fans and V-belts caused by the thermostat and the start/stop cycling of the unit.

CAUTION

Under no circumstances should anyone attempt to repair the Logic or Display Boards !

Should a problem develop with these components, contact your nearest Carrier Transicold dealer for replacement.

CAUTION

Observe proper polarity when installing battery, negative terminal must be grounded. Reverse polarity will destroy the rectifier diodes in alternator. As a precautionary measure, disconnect positive battery terminal when charging battery in unit. Connecting charger in reverse will destroy the rectifier diodes in alternator.

CAUTION

Under no circumstances should a technician electrically probe the processor at any point, other than the connector terminals where the harness attaches. Microprocessor components operate at different voltage levels and at extremely low current levels. Improper use of voltmeters, jumper wires, continuity testers, etc. could permanently damage the processor.

CAUTION

Most electronic components are susceptible to damage caused by electrical static discharge (ESD). In certain case, the human body can have enough static electricity to cause resultant damage to the components by touch. This is especially true of the integrated circuits found on the truck/trailer microprocessor.

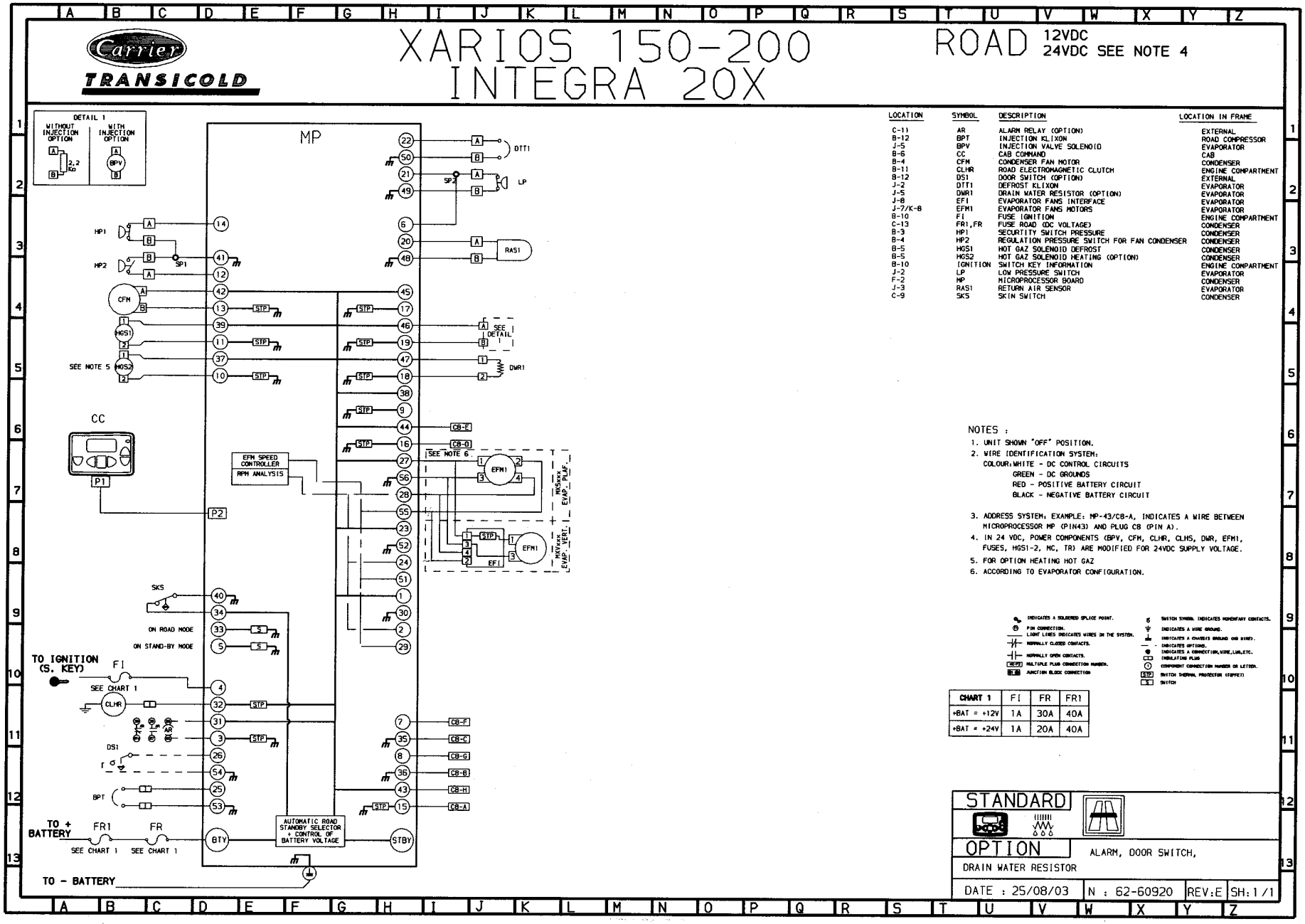


Figure 7-1 – XARIOS 150/200: Electrical schematic diagram – ROAD – 12V/24V

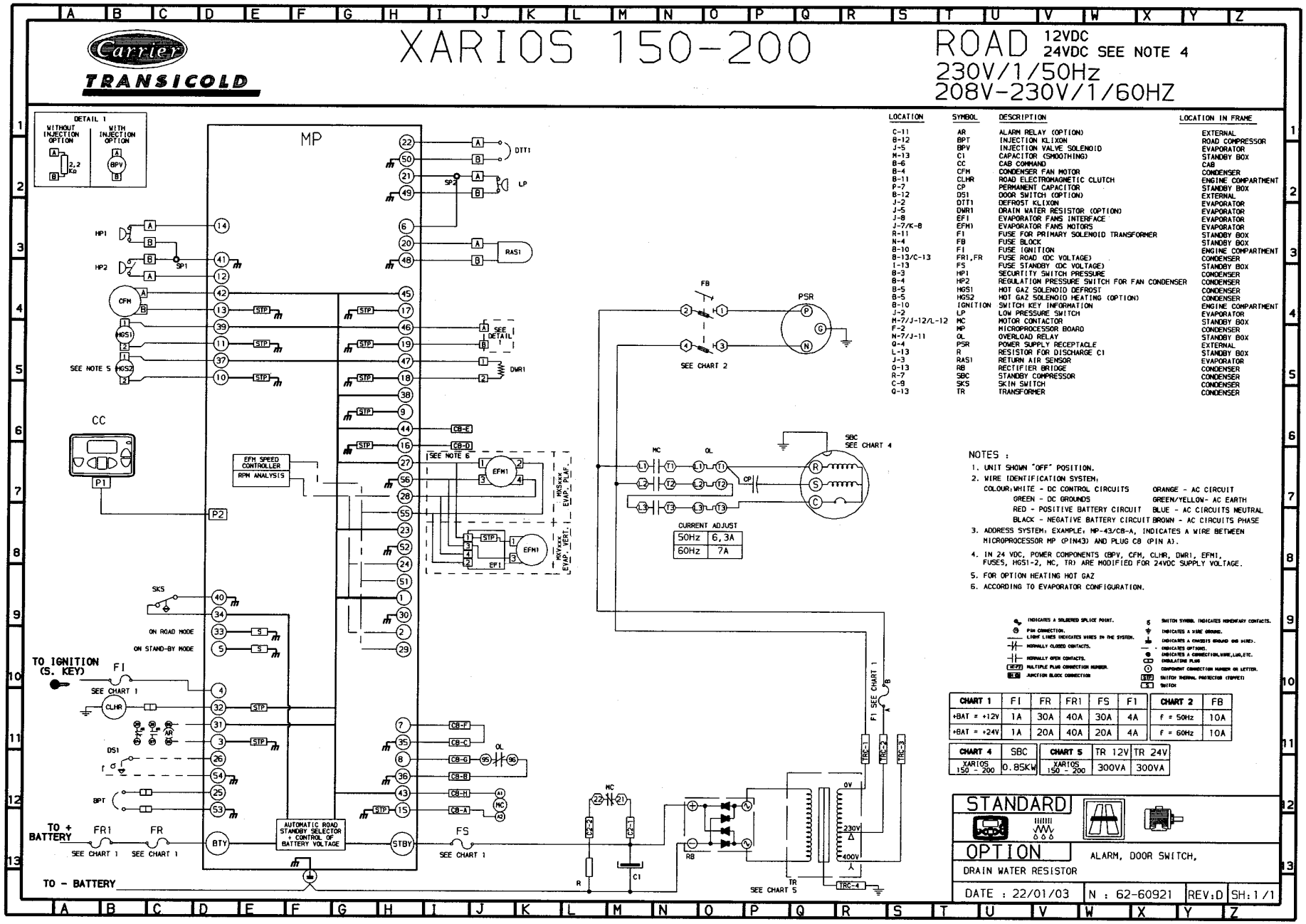


Figure 7-2 – XARIOS 150/200: Electrical schematic diagram – ROAD – 230/1/50Hz – 208–230/1/60Hz

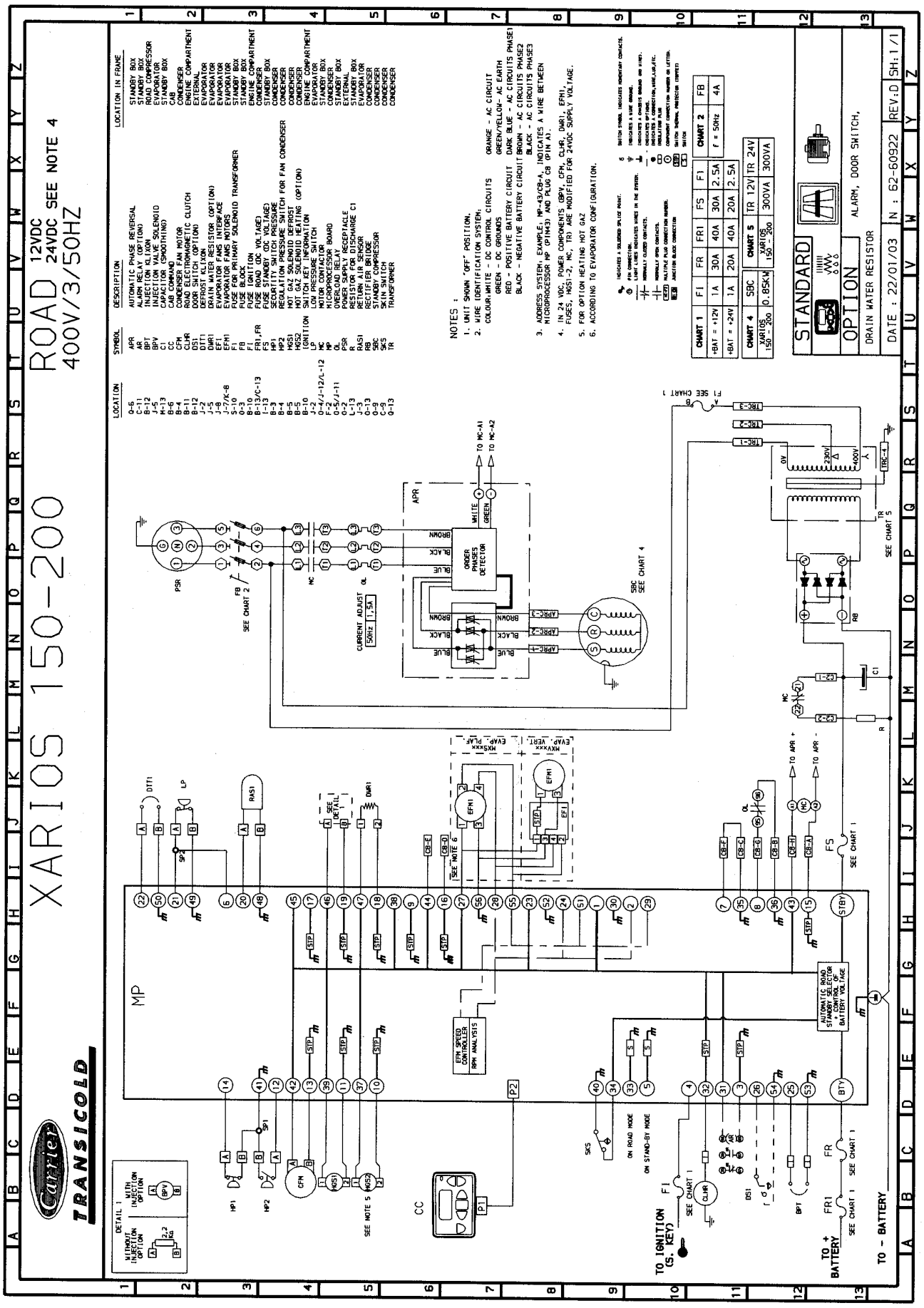


Figure 7-3 – XARIOS 150/200: Electrical schematic diagram –ROAD – 400/3/50Hz

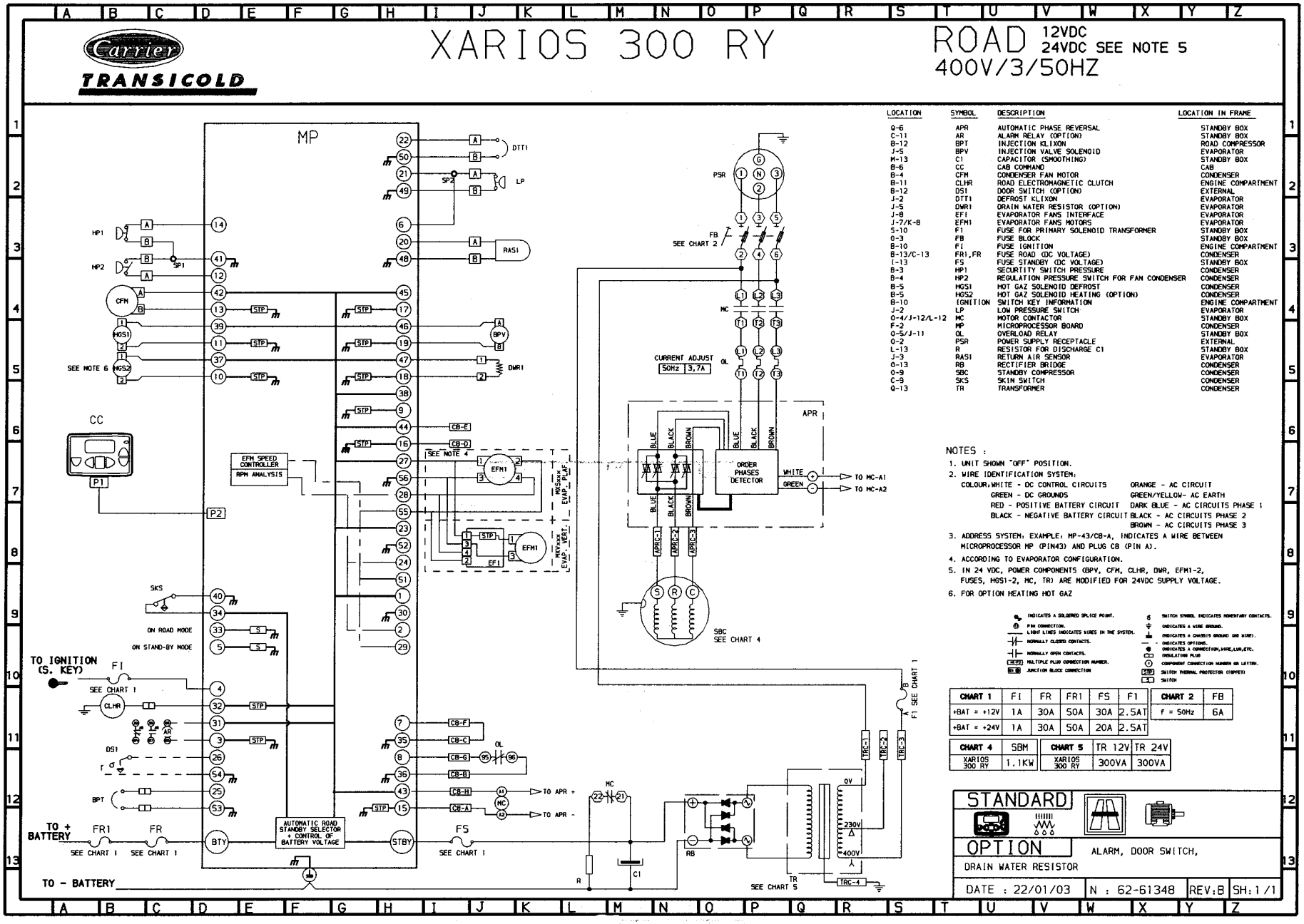
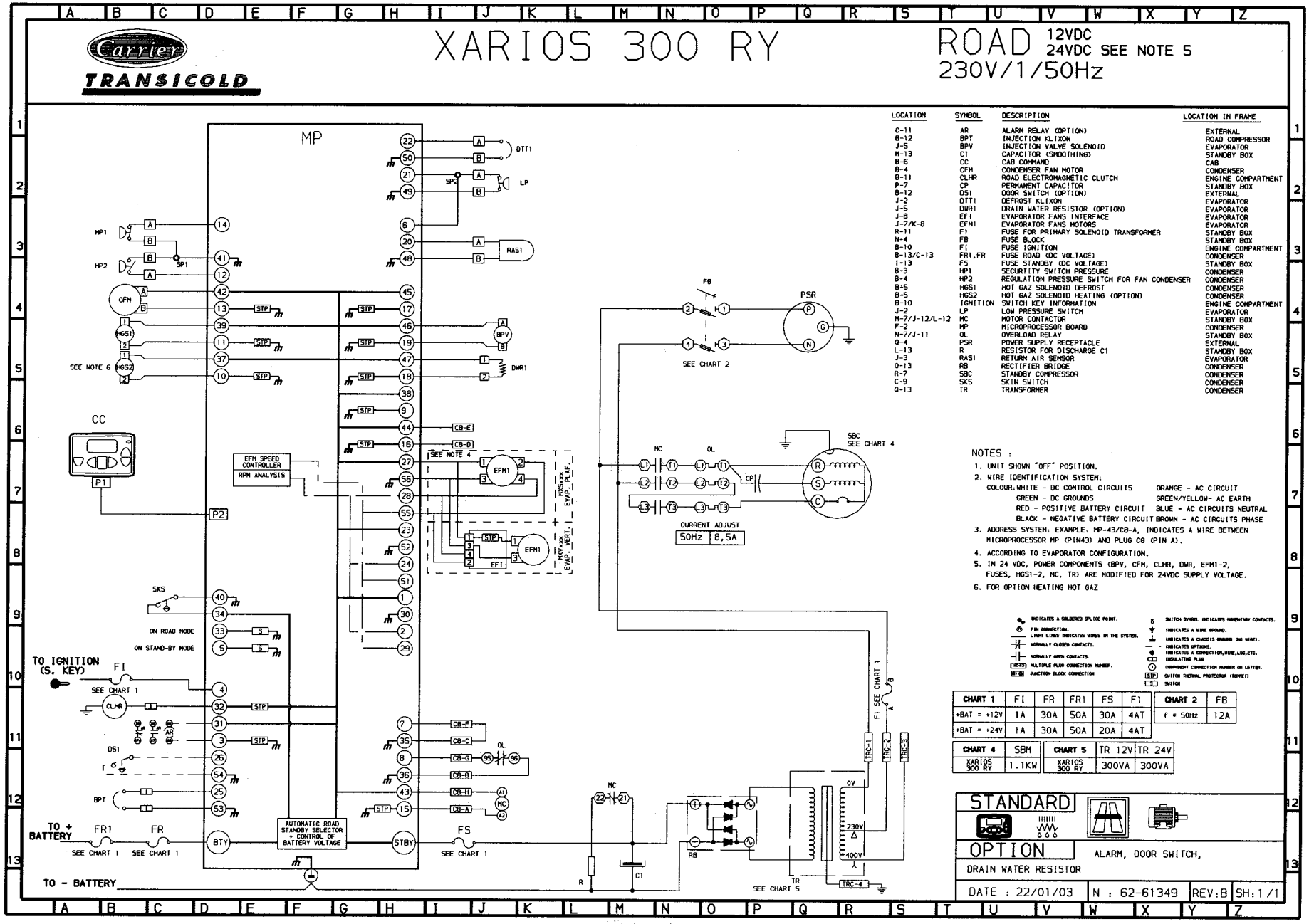


Figure 7-4 – XARIOS 300ry: Electrical schematic diagram – Road/Standby – 400/3/50Hz



LOCATION	SYMBOL	DESCRIPTION	LOCATION IN FRAME
C-11	AR	ALARM RELAY (OPTION)	EXTERNAL
B-12	BPT	INJECTION KLIXON	ROAD COMPRESSOR
J-5	BPV	INJECTION VALVE SOLENOID	EVAPORATOR
M-13	C1	CAPACITOR (SMOOTHING)	STANDBY BOX
B-6	CC	CAB COMMAND	CAB
B-4	CFM	CONDENSER FAN MOTOR	CONDENSER
B-11	CLHR	ROAD ELECTROMAGNETIC CLUTCH	ENGINE COMPARTMENT
P-7	CP	PERMANENT CAPACITOR	STANDBY BOX
B-12	DSI	DOOR SWITCH (OPTION)	EXTERNAL
J-2	DTT1	DEFROST KLIXON	EVAPORATOR
J-5	DWR1	DRAIN WATER RESISTOR (OPTION)	EVAPORATOR
J-8	EFI	EVAPORATOR FANS INTERFACE	EVAPORATOR
J-7/K-8	EFM1	EVAPORATOR FANS MOTORS	EVAPORATOR
R-11	FI	FUSE FOR PRIMARY SOLENOID TRANSFORMER	STANDBY BOX
N-4	FB	FUSE BLOCK	STANDBY BOX
B-10	FI	FUSE IGNITION	ENGINE COMPARTMENT
B-13/C-13	FR1,FR	FUSE ROAD (DC VOLTAGE)	CONDENSER
I-13	FS	FUSE STANDBY (DC VOLTAGE)	STANDBY BOX
B-3	HP1	SECURITY SWITCH PRESSURE	CONDENSER
B-4	HP2	REGULATION PRESSURE SWITCH FOR FAN CONDENSER	CONDENSER
B-5	HGS1	HOT GAZ SOLENOID DEFROST	CONDENSER
B-5	HGS2	HOT GAZ SOLENOID HEATING (OPTION)	CONDENSER
B-10	IGNITION	SWITCH KEY INFORMATION	ENGINE COMPARTMENT
J-2	LP	LOW PRESSURE SWITCH	EVAPORATOR
M-7/J-12/L-12	MC	MOTOR CONTACTOR	STANDBY BOX
F-2	MP	MICROPROCESSOR BOARD	CONDENSER
N-7/J-11	OL	OVERLOAD RELAY	STANDBY BOX
Q-4	PSR	POWER SUPPLY RECEPTACLE	EXTERNAL
L-13	R	RESISTOR FOR DISCHARGE C1	STANDBY BOX
J-3	RAS1	RETURN AIR SENSOR	EVAPORATOR
O-13	RB	RECTIFIER BRIDGE	CONDENSER
R-7	SBC	STANDBY COMPRESSOR	CONDENSER
C-9	SKS	SKIN SWITCH	CONDENSER
Q-13	TR	TRANSFORMER	CONDENSER

CHART 1	FI	FR	FR1	FS	FI
+BAT = +12V	1A	30A	50A	30A	4AT
+BAT = +24V	1A	30A	50A	20A	4AT

CHART 2	FB
F = 50Hz	12A

CHART 4	SBM
XARIOS 300 RY	1.1KW

CHART 5	TR 12V	TR 24V
XARIOS 300 RY	300VA	300VA

Figure 7-5 – XARIOS 300ry: Electrical schematic diagram Road/Standby – 230/1/50Hz

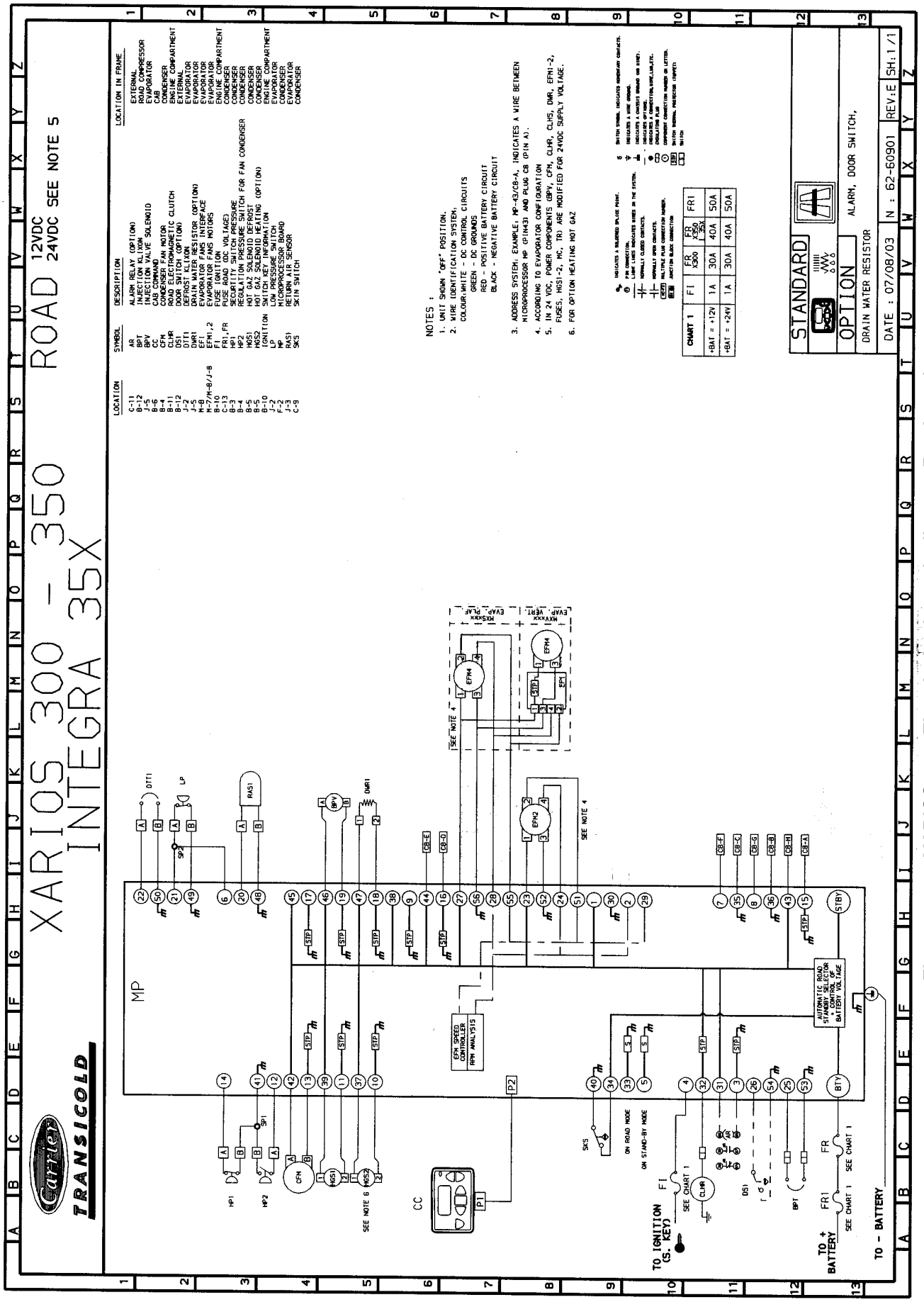


Figure 7-6 – XARIOS 350: Electrical schematic diagram Road version

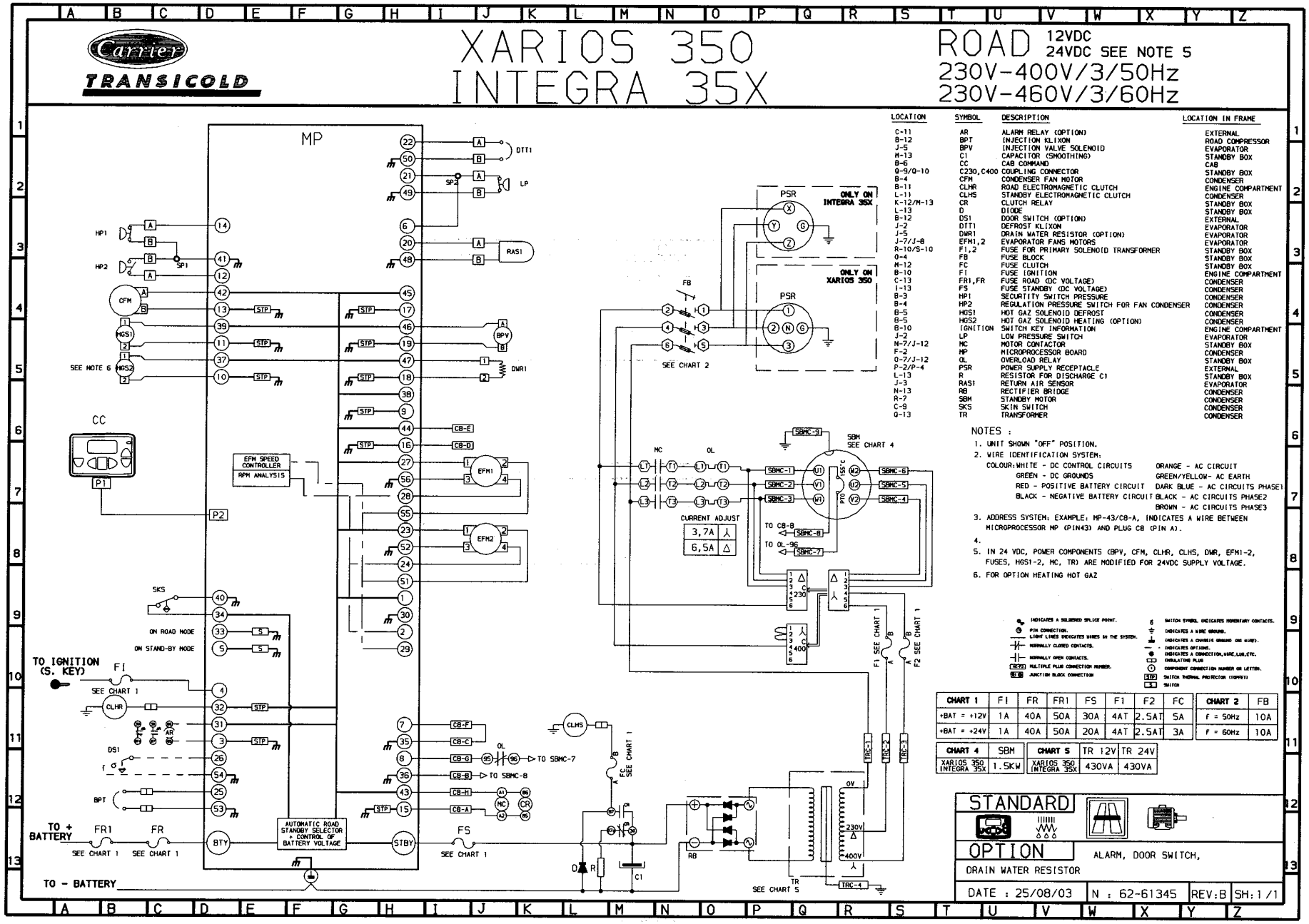


Figure 7-7 – XARIOS 350: Electrical schematic diagram Road/Standby – 230/400/3/50Hz/60Hz

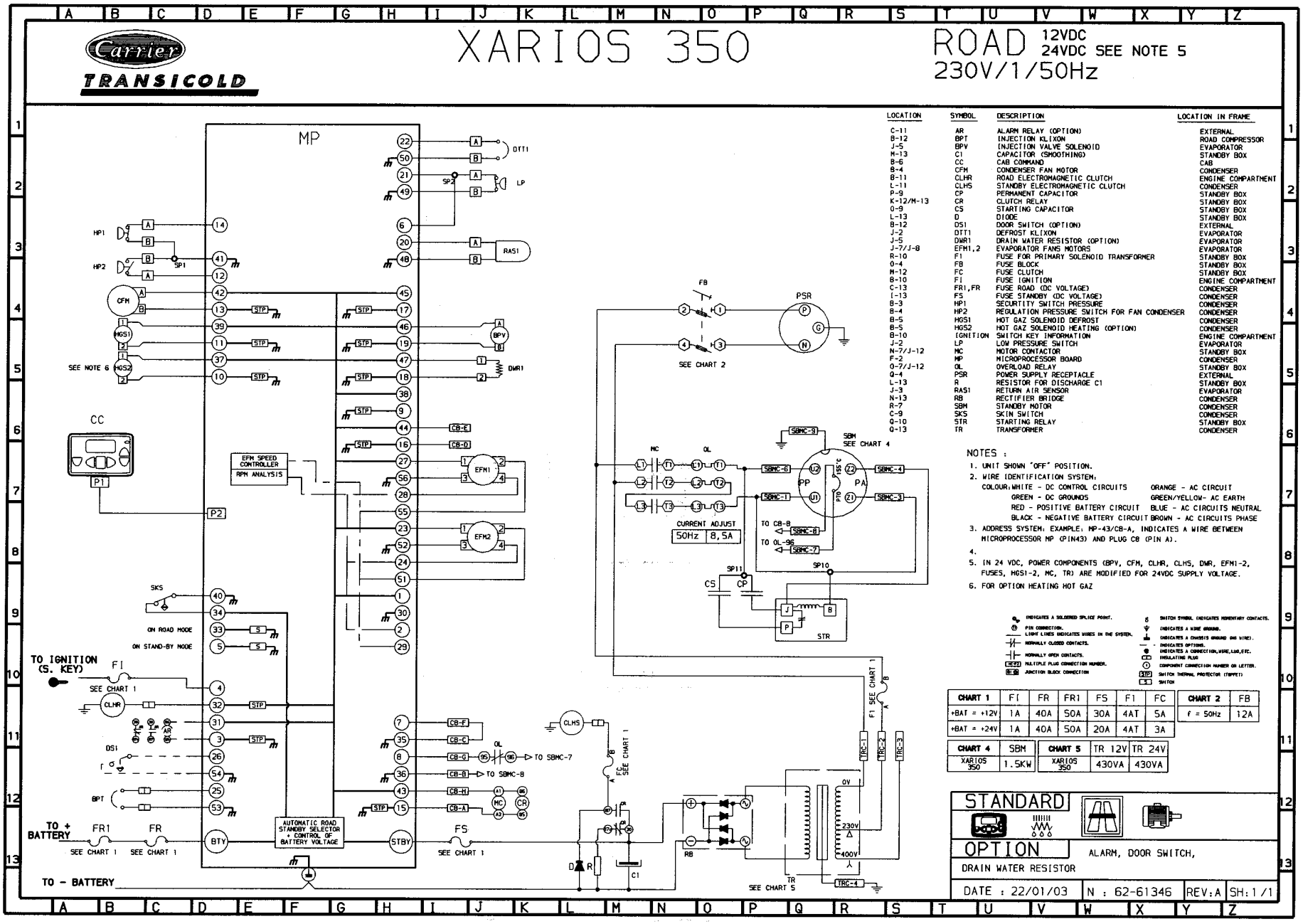
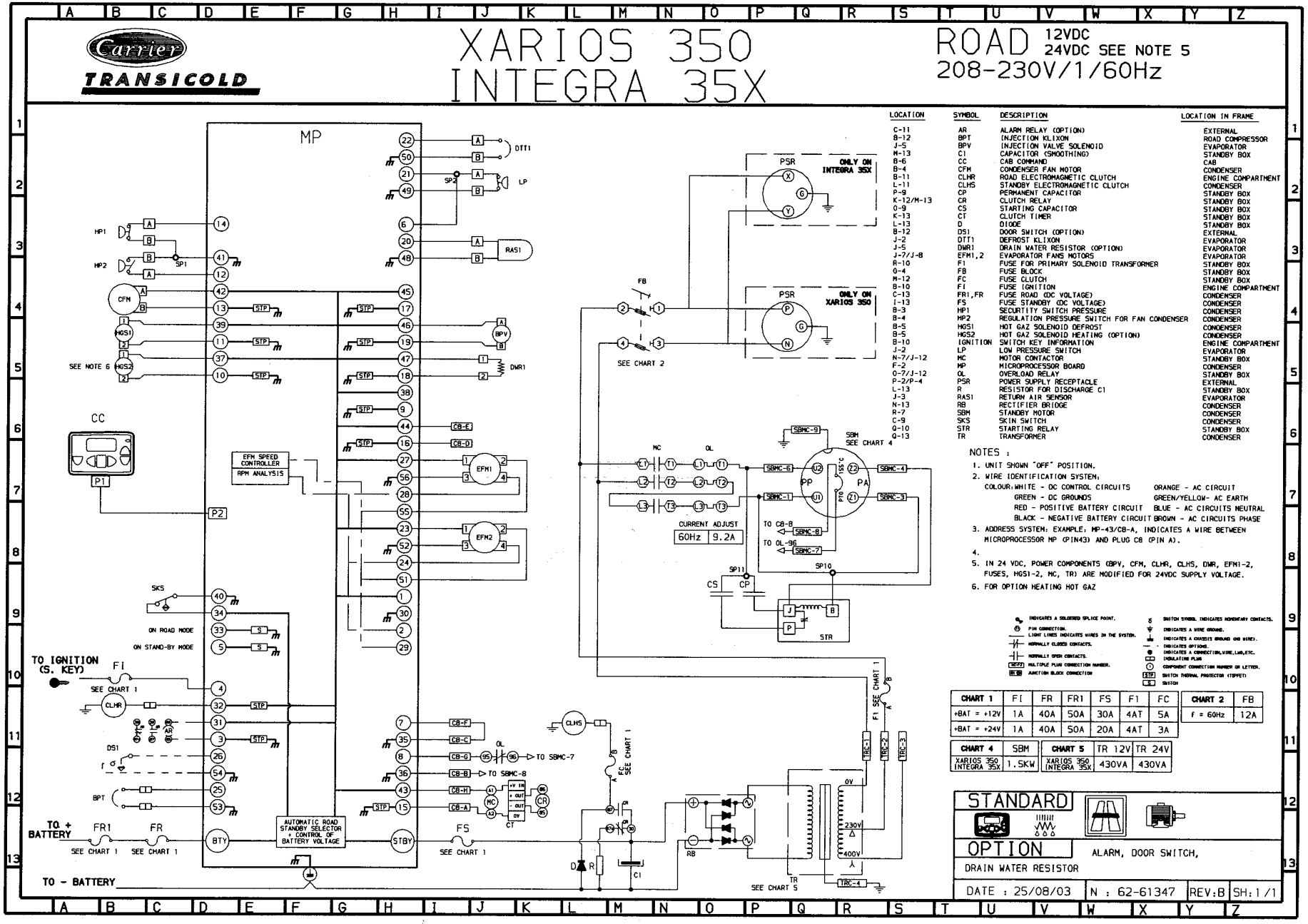


Figure 7-8 – XARIOS 350: Electrical schematic diagram Road/Standby version – 230/1/50Hz



LOCATION	SYMBOL	DESCRIPTION	LOCATION IN FRAME
C-11	AR	ALARM RELAY (OPTION)	EXTERNAL
B-12	BPT	INJECTION KLIXON	ROAD COMPRESSOR
J-5	BPV	INJECTION VALVE SOLENOID	EVAPORATOR
M-13	C1	CAPACITOR (SMOOTHING)	STANDBY BOX
B-6	CC	CAB COMMAND	CAB
B-4	CFM	CONDENSER FAN MOTOR	CONDENSER
B-11	CLHR	ROAD ELECTROMAGNETIC CLUTCH	ENGINE COMPARTMENT
L-11	CLHS	STANDBY ELECTROMAGNETIC CLUTCH	CONDENSER
P-9	CP	PERMANENT CAPACITOR	STANDBY BOX
K-12/M-13	CR	CLUTCH RELAY	STANDBY BOX
O-9	CS	STARTING CAPACITOR	STANDBY BOX
K-13	CT	CLUTCH TIMER	STANDBY BOX
L-13	D	DIODE	STANDBY BOX
B-12	DS1	DOOR SWITCH (OPTION)	EXTERNAL
J-2	DTT1	DEFROST KLIXON	EVAPORATOR
J-5	DWR1	DRAIN WATER RESISTOR (OPTION)	EVAPORATOR
J-7/J-8	EFM1,2	EVAPORATOR FANS MOTORS	EVAPORATOR
R-10	F1	FUSE FOR PRIMARY SOLENOID TRANSFORMER	STANDBY BOX
O-4	FB	FUSE BLOCK	STANDBY BOX
M-12	FC	FUSE CLUTCH	STANDBY BOX
B-10	FI	FUSE IGNITION	ENGINE COMPARTMENT
C-13	FR1,FR	FUSE ROAD (DC VOLTAGE)	CONDENSER
I-13	FS	FUSE STANDBY (DC VOLTAGE)	CONDENSER
B-3	HP1	SECURITY SWITCH PRESSURE	CONDENSER
B-4	HP2	REGULATION PRESSURE SWITCH FOR FAN CONDENSER	CONDENSER
B-5	HGS1	HOT GAZ SOLENOID DEFROST	CONDENSER
B-5	HGS2	HOT GAZ SOLENOID HEATING (OPTION)	CONDENSER
B-10	IGNITION	SWITCH KEY INFORMATION	ENGINE COMPARTMENT
J-2	LP	LOW PRESSURE SWITCH	EVAPORATOR
N-7/J-12	MC	MOTOR CONTACTOR	STANDBY BOX
F-2	MP	MICROPROCESSOR BOARD	CONDENSER
O-7/J-12	OL	OVERLOAD RELAY	STANDBY BOX
P-2/P-4	PSR	POWER SUPPLY RECEPTACLE	EXTERNAL
L-13	R	RESISTOR FOR DISCHARGE C1	STANDBY BOX
J-3	RAS1	RETURN AIR SENSOR	EVAPORATOR
N-13	RB	RECTIFIER BRIDGE	CONDENSER
R-7	SBM	STANDBY MOTOR	CONDENSER
C-9	SKS	SKIN SWITCH	CONDENSER
Q-10	STR	STARTING RELAY	STANDBY BOX
Q-13	TR	TRANSFORMER	CONDENSER

Figure 7-9 – XARIOS 350: Electrical schematic diagram Road/Standby – 208-230/1/60Hz

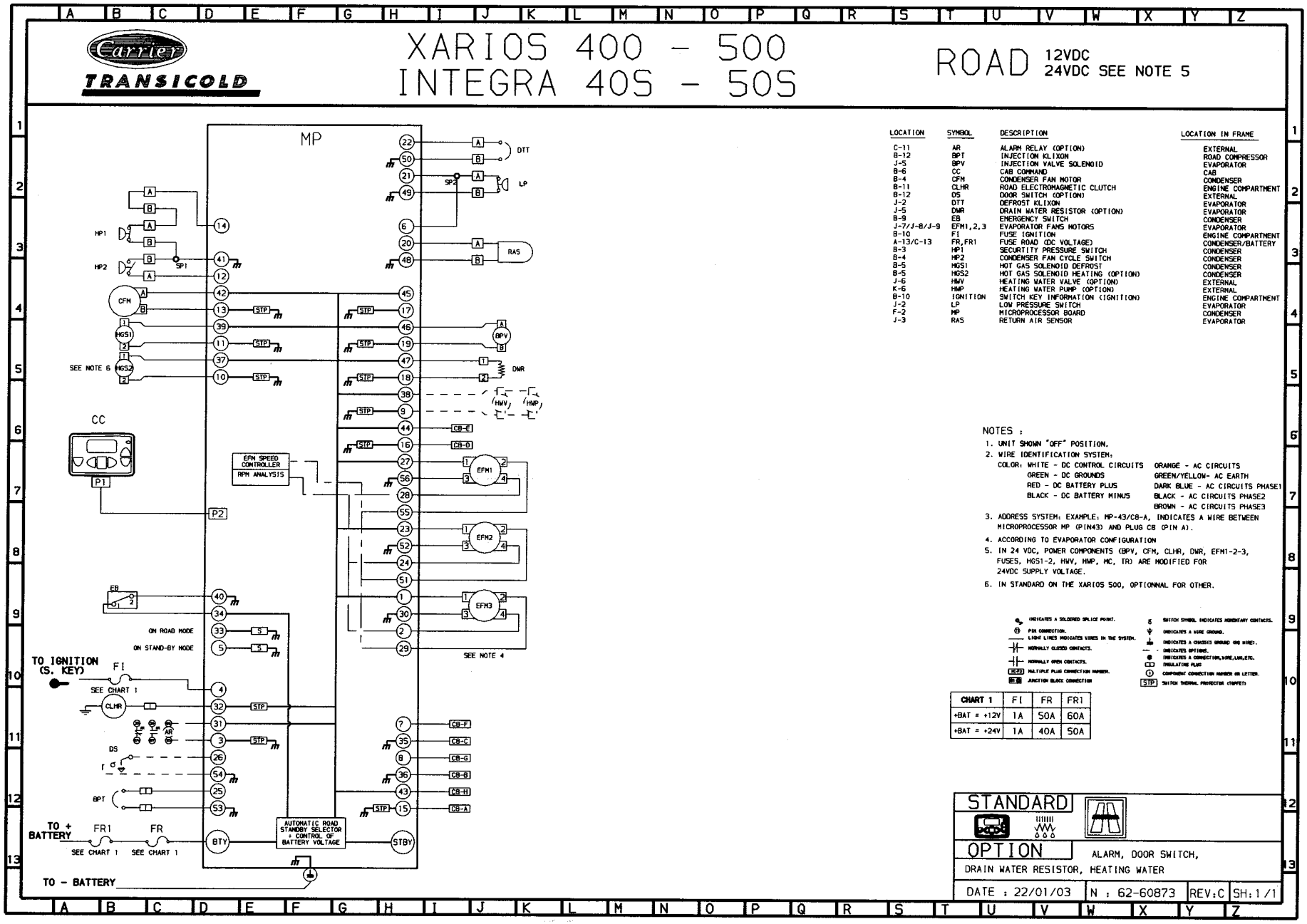


Figure 7-10 – XARIOS 400/500: Electrical schematic diagram – Road version

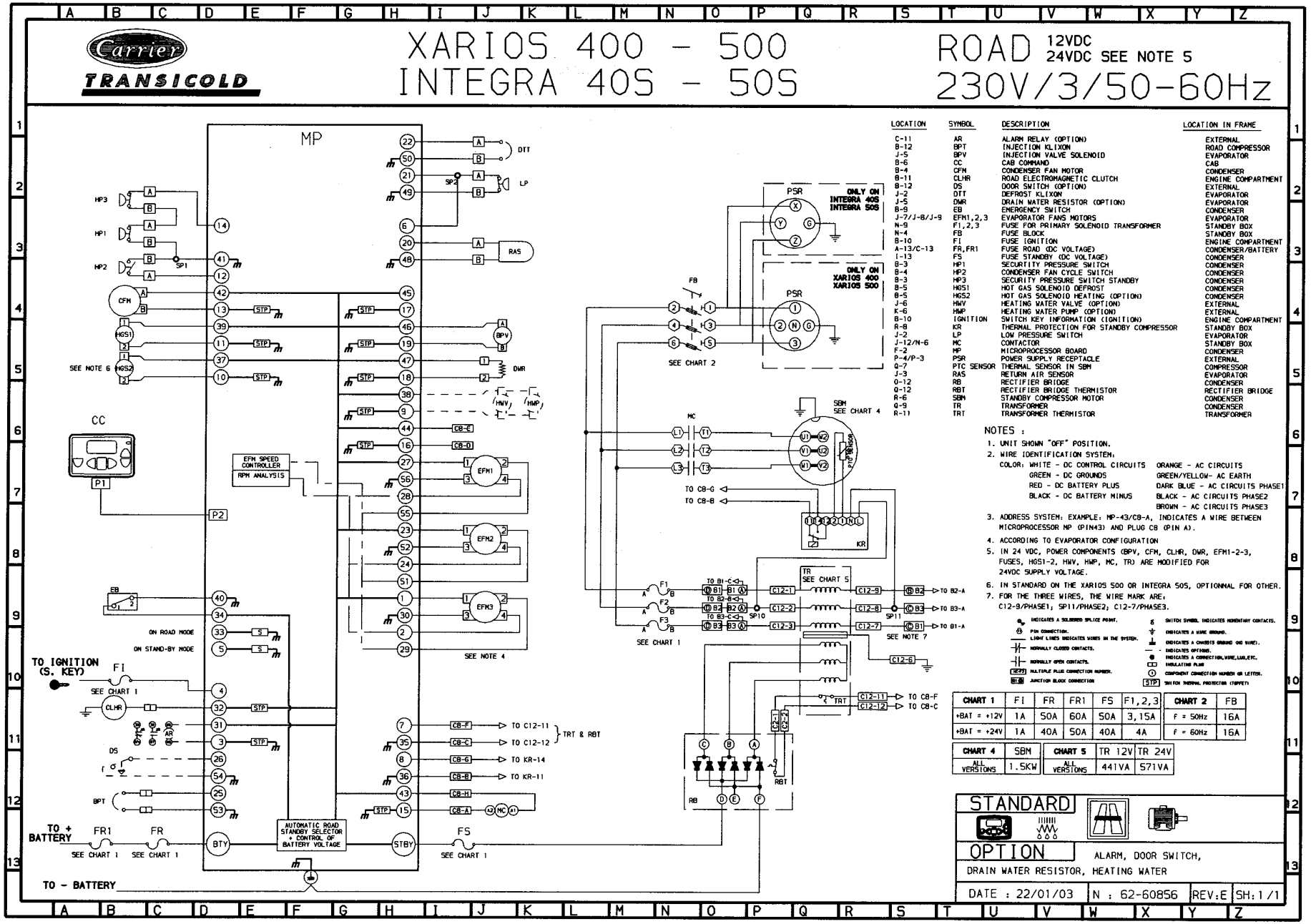
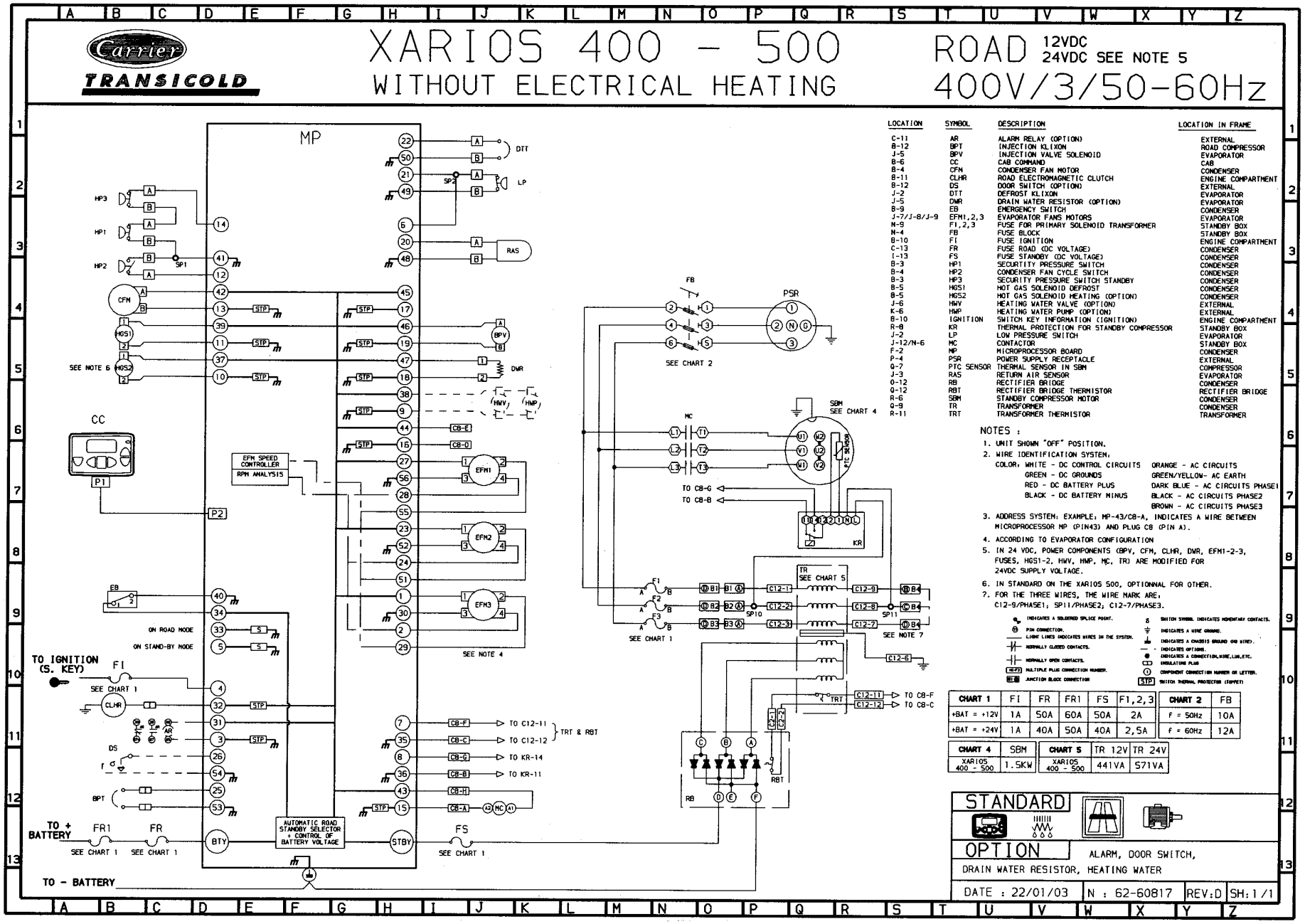


Figure 7-11 – XARIOS 400/500: Electrical schematic diagram – Road version 230V without electrical heating



LOCATION	SYMBOL	DESCRIPTION	LOCATION IN FRAME
C-11	AR	ALARM RELAY (OPTION)	EXTERNAL
B-12	BPT	INJECTION KLIXON	ROAD COMPRESSOR
J-5	BPV	INJECTION VALVE SOLENOID	EVAPORATOR
B-6	CC	CAB COMMAND	CAB
B-4	CFM	CONDENSER FAN MOTOR	CONDENSER
B-11	CLHR	ROAD ELECTROMAGNETIC CLUTCH	ENGINE COMPARTMENT
B-12	DS	DOOR SWITCH (OPTION)	EXTERNAL
J-2	DTT	DEFROST KLIXON	EVAPORATOR
J-5	DWR	DRAIN WATER RESISTOR (OPTION)	EVAPORATOR
B-9	EB	EMERGENCY SWITCH	CONDENSER
J-7/J-8/J-9	EFM1,2,3	EVAPORATOR FANS MOTORS	EVAPORATOR
N-9	F1,2,3	FUSE FOR PRIMARY SOLENOID TRANSFORMER	STANDBY BOX
N-4	FB	FUSE BLOCK	STANDBY BOX
B-10	FI	FUSE IGNITION	ENGINE COMPARTMENT
C-13	FR	FUSE ROAD (DC VOLTAGE)	CONDENSER
I-13	FS	FUSE STANDBY (DC VOLTAGE)	CONDENSER
B-3	HP1	SECURITY PRESSURE SWITCH	CONDENSER
B-4	HP2	CONDENSER FAN CYCLE SWITCH	CONDENSER
B-3	HP3	SECURITY PRESSURE SWITCH STANDBY	CONDENSER
B-5	HGS1	HOT GAS SOLENOID DEFROST	CONDENSER
B-5	HGS2	HOT GAS SOLENOID HEATING (OPTION)	CONDENSER
J-6	HWV	HEATING WATER VALVE (OPTION)	EXTERNAL
K-6	HWP	HEATING WATER PUMP (OPTION)	EXTERNAL
B-10	IGNITION	SWITCH KEY INFORMATION (IGNITION)	ENGINE COMPARTMENT
R-8	KR	THERMAL PROTECTION FOR STANDBY COMPRESSOR	STANDBY BOX
J-2	LP	LOW PRESSURE SWITCH	EVAPORATOR
J-12/N-6	MC	CONTACTOR	STANDBY BOX
F-2	MP	MICROPROCESSOR BOARD	CONDENSER
P-4	PSR	POWER SUPPLY RECEPTACLE	EXTERNAL
Q-7	PTC SENSOR	THERMAL SENSOR IN SBM	COMPRESSOR
J-3	RAS	RETURN AIR SENSOR	EVAPORATOR
Q-12	RB	RECTIFIER BRIDGE	CONDENSER
Q-12	RBT	RECTIFIER BRIDGE THERMISTOR	RECTIFIER BRIDGE
R-6	SBM	STANDBY COMPRESSOR MOTOR	CONDENSER
Q-9	TR	TRANSFORMER	CONDENSER
R-11	TRT	TRANSFORMER THERMISTOR	TRANSFORMER

NOTES :

1. UNIT SHOWN "OFF" POSITION.
2. WIRE IDENTIFICATION SYSTEM:
   COLOR: WHITE - DC CONTROL CIRCUITS
   GREEN - DC GROUNDS
   RED - DC BATTERY PLUS
   BLACK - DC BATTERY MINUS
   ORANGE - AC CIRCUITS
   GREEN/YELLOW- AC EARTH
   DARK BLUE - AC CIRCUITS PHASE1
   BLACK - AC CIRCUITS PHASE2
   BROWN - AC CIRCUITS PHASE3
3. ADDRESS SYSTEM: EXAMPLE: MP-43/C8-A, INDICATES A WIRE BETWEEN MICROPROCESSOR MP (PIN43) AND PLUG C8 (PIN A).
4. ACCORDING TO EVAPORATOR CONFIGURATION
5. IN 24 VDC, POWER COMPONENTS (BPV, CFM, CLHR, DWR, EFM1-2-3, FUSES, HGS1-2, HWV, HMP, MC, TR) ARE MODIFIED FOR 24VDC SUPPLY VOLTAGE.
6. IN STANDARD ON THE XARIOS 500, OPTIONNAL FOR OTHER.
7. FOR THE THREE WIRES, THE WIRE MARK ARE, C12-9/PHASE1; SP11/PHASE2; C12-7/PHASE3.

CHART 1	FI	FR	FR1	FS	F1,2,3	CHART 2	FB
+BAT = +12V	1A	50A	60A	50A	2A	F = 50Hz	10A
+BAT = +24V	1A	40A	50A	40A	2,5A	F = 60Hz	12A

CHART 4	SBM	CHART 5	TR 12V	TR 24V
XARIOS 400 - 500	1.5KW	XARIOS 400 - 500	441VA	571VA

STANDARD
OPTION ALARM, DOOR SWITCH, DRAIN WATER RESISTOR, HEATING WATER

DATE : 22/01/03 | N : 62-60817 | REV:D | SH:1/1

Figure 7-12 – XARIOS 400/500: Electrical schematic diagram – Road version 400V without electrical heating

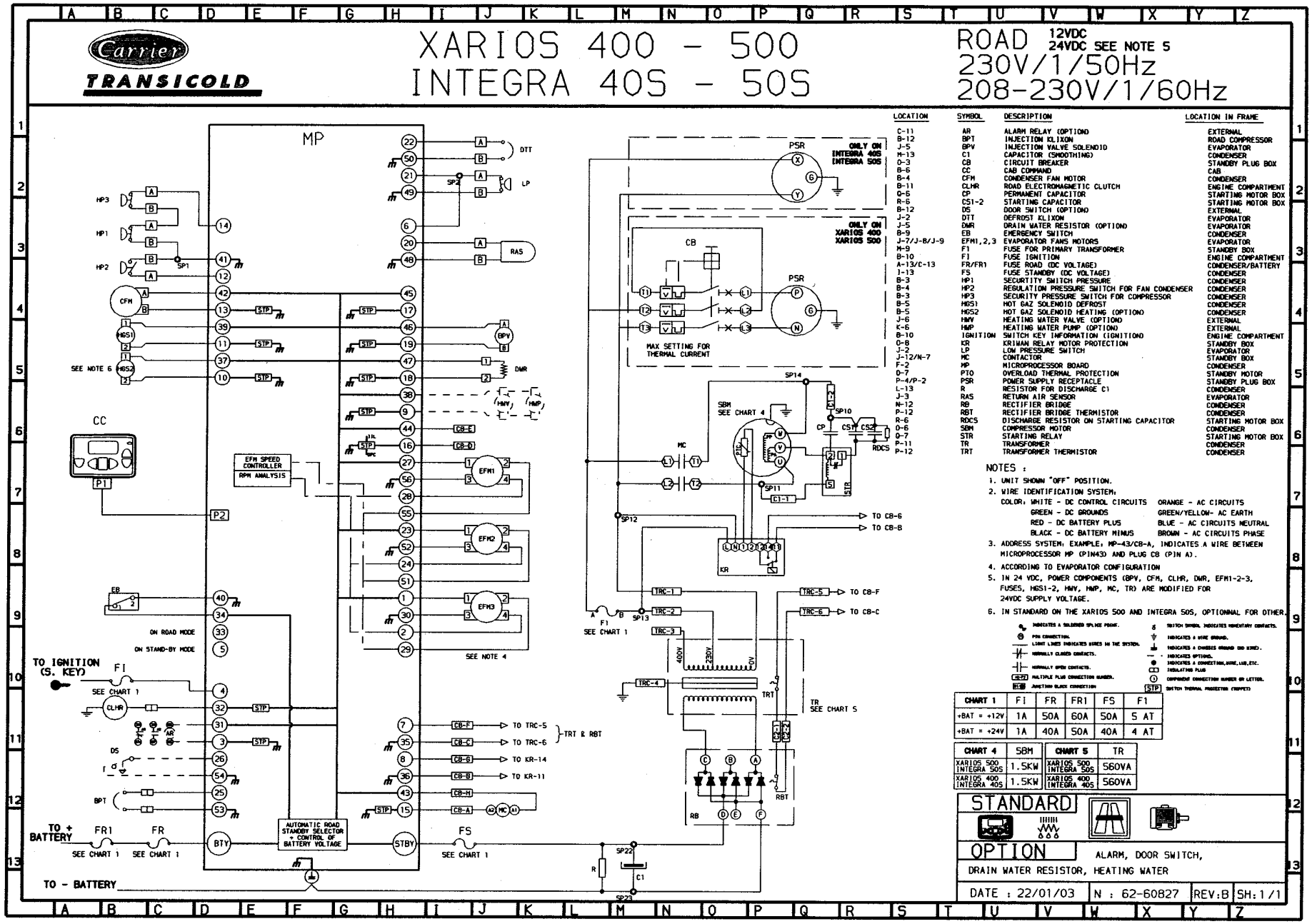


Figure 7-13 – XARIOS 400/500: Electrical schematic diagram – Road/standby – 208–230/1/50–60Hz